

AUTOMOTIVE INDUSTRIES

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Automotive Industries

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December 13, 1930

Automotive Industries

AUTOMOTIVE INDUSTRIES

VOLUME 63

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by Edmund B. Neil

Director of Research
Chilton Class Journal Co.

Before any clear interpretation can be made of what the industry may do in the future it is necessary to clear away the befogging influence of the "saturation" bugaboo. We often hear that when the saturation point is reached, automotive progress will stop; that this condition will spell stagnation and may ultimately be the final chapter of automotive development. As a matter of fact, sales of passenger cars have been going on under preliminary conditions of saturation for the past six years. During these years the average net car sales have been showing only a small increase, a condition sometimes expressed as saturation.

Another equally good definition of saturation is that saturation will be reached when domestic sales of passenger cars equal the number of cars annually discarded.

But it cannot be assumed, even under this definition, that sales will not continue to show annual increases when averaged to eliminate minor influences.

Still another measure of saturation has been given as that condition when sales of cars increase at a rate no faster than the growth of the country as measured by increased population and a continued high standard of living.

Many industries have been operating under conditions of technical saturation for a number of years. This condition is accepted, therefore, as a natural

Passenger Car Production Gages Industry's Future

PRODUCTION of passenger cars is undoubtedly one of the most important factors in the minds of all those interested in basic conditions of the automotive industry. It may be considered as the determining element in the continued growth of the industry in the years to come.

Because less than 10 per cent of all passenger cars produced are exported, and only recently have exports of motor trucks exceeded 25 per cent of annual production, general points relating to domestic sales will be presented first.

course rather than as anything abnormal and is no reason why the automotive industry needs to be fearful of operating under the same economic condition.

According to the United States census there were 122,775,046 persons in the United States early in 1930. This total represents a growth of population in every 10 years of 15.6 per cent or 1.56 per cent per annum. This is deduced after allowance was made for differences in time during the decennial years when various tabulations were taken.

Although total population figures can be used satisfactorily in making calculations of market growth, figures of the numbers of families in the country at various times show a more directly associated factor. The table shown herewith indicates that every ten years we may expect a growth of approximately 4,000,000 families in the country or about 400,000 families per year. There seems to be every indication that this will hold true 10 years hence. Comparing these figures with passenger car registrations and assuming that the family is the primary unit of car buying-power, it is further evident that we have not reached saturation on a "per family" basis by about 4,000,000 passenger cars.

If, at the same time, we accept the theory that there are some 3,000,000 cars in multi-car owning families, we are still further away from reaching the limit. Due to duplicate registrations of automobiles in various states, we find discrepancies existing in tabulating cars separate from motor trucks. These and other statistical factors of error incident to determining correct car registration figures would tend to keep us further from theoretical saturation.

Although it cannot be assumed that every family will own one or more automobiles in the future, those families which do not own cars now form a substantial

and increasing market. Complete saturation of this market may also depend to a large extent upon the initial outlay for the car itself plus cost of operation, and it is not inconceivable that a large market exists for automobiles selling at lower prices than the present low levels.

Chart 1 shows this relationship between car registrations and the growing number of families in the United States. This chart indicates that:

1. Passenger car registrations will continue to increase at a decreasing rate until the curve becomes close to and follows the "number of families" line, at which point further increase in registrations must depend upon sale of cars for replacement, plus growth due to increase in number of families, plus sales to multi-car owning families.

2. The average point at which all cars sold will be for replacement (except those to newly created families, etc.) will apparently be reached about the year 1935.

3. Increases in registrations thereafter will probably depend upon sales to these "new families" plus selling to additional families which either are not then able to buy cars or which then own one car or more.

4. A regularly increasing total of sales and registrations as long as the buying power of the automobile purchasing public is not curtailed.

It may be pointed out that there is no reason why the car registration line should not go above the number of families line—as would be the case if all families in the United States owned one or more cars or there was a sufficient number of cars in multi-automobile owning families to offset the number of those families which own no cars at all.

The crossing of these lines depends upon a number of factors, the most important of which probably is

that buying power of prospective purchasers continues to remain at least as high as it has been in recent years.

Although the future replacement demand for automobiles has been considered from many angles (*x), let us con-

* See "The Life History of Automobiles" by C. E. Griffin, University of Michigan Business Studies, February, 1926, and review in Automotive Industries, April 8, 1926, articles in Automotive Industries, April 29, 1926, and November 12, 1927. Also The Annalist, Friday, April 19, 1929, article by Prof. Griffin, The Replacement Demand for Automobiles: A Forecast For Each Year to 1935.

x Note that many studies of eliminations and predictions of future conditions are based upon figures including motor truck sales and registrations. As will be discussed later this tends to give an erroneous view.

Table I
Eliminations—Passenger Cars Only

Year	U. S. Car Registrations (N.A.C.C.)	U. S. Car Sales	Cumulative U. S. Car Sales	Unadjusted Eliminations
1910	458,500	170,000		
11	619,500	190,000	360,000	29,000
12	902,600	330,000	690,000	46,900
13	1,194,260	435,000	1,125,000	143,340
14	1,625,740	520,000	1,645,000	88,525
15	2,309,670	860,000	2,505,000	176,075
16	3,298,000	1,475,000	2,980,000	486,665
17	4,657,340	1,700,000	4,680,000	340,655
18	5,621,620	890,000	5,570,000	74,275
19	6,771,075	1,590,505	7,160,505	441,050
1920	8,225,860	1,758,560	8,919,065	303,775
21	9,346,195	1,408,485	10,327,550	288,150
22	10,864,130	2,171,250	12,498,800	653,515
23	13,479,610	3,439,520	15,938,320	824,040
24	15,460,650	2,961,385	18,899,705	980,345
25	17,512,640	3,413,275	22,313,000	1,361,285
26	19,237,170	3,414,300	25,727,300	1,689,770
27	20,219,225	2,701,300	28,428,600	1,719,245
28	21,379,125	3,241,300	31,669,900	2,081,400
29	23,146,000	4,016,000	35,685,900	2,249,125
1930	23,400,000*	2,700,000*	38,385,900*	2,446,000*

* Estimated.

December 13, 1930

Automotive Industries

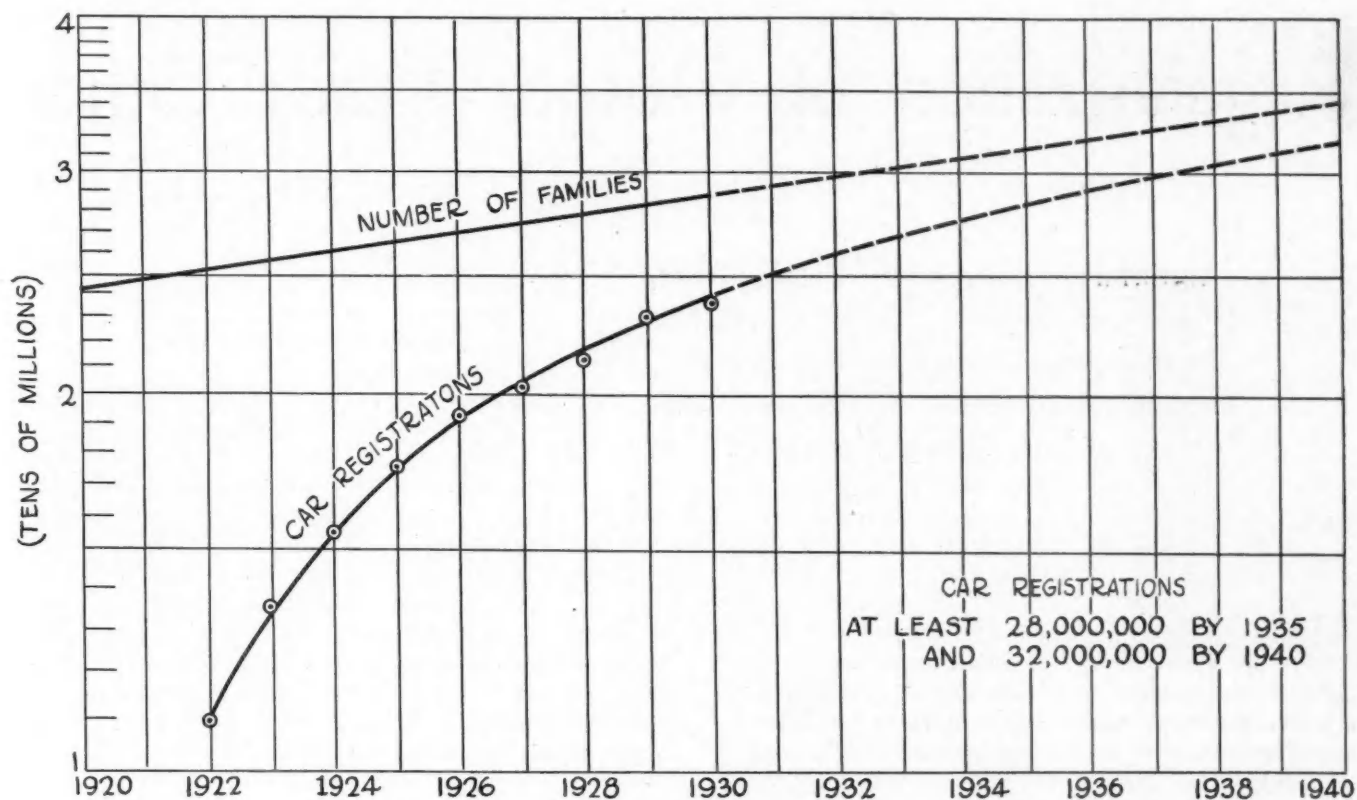


Chart I

Ratio chart projected to 1940, showing United States passenger car registrations as compared with number of families in this country

sider a point raised by Prof. C. E. Griffin:

"In order for the automobile industry to continue to produce at approximately the rate of the past few years, it is only necessary for it to find an ever smaller number of new users. For example, in 1925 for the industry to sell 3,800,000 motor vehicles to the United States market it was necessary to increase the total number in use by about 2,000,000. In 1930, in order to sell the same number of cars it will only be necessary to increase the total number of cars in use by about 900,000, and by 1935 the necessary sales over replacements will be reduced to about 156,000." Prof. Griffin is here referring to the domestic sale of both cars and trucks.

Since he made this presentation (April, 1929) general business conditions and circumstances have affected market conditions during the past eleven months, altering the accuracy of his projected 1930 figure.

Table 1 has been prepared from the best available passenger car registration and sales figures in order to indicate somewhat more closely the condition of the replacement market for passenger cars alone. This indication is somewhat more ac-

curate than would be possible by using a combined "passenger car and trucks" table. This table, shown herewith, indicates that the year 1930 will turn out to be one wherein practically all domestic car sales will be for replacement of automobile scrap—possibly the total sales figure will be less than the number discarded during the year, leaving a number of former car owners who may be in the market for new cars as soon as improved business conditions permit. Whether or not eliminations will equal or exceed sales must remain a question until more complete figures are available.

While truck sales to foreign countries have been increasing substantially in recent years, there seems to be no reason to believe that this has been due to any decrease in the size of the domestic market. Increased truck exports apparently reflect the general development of transportation needs and highway facilities abroad just as they have done in this country.

The domestic market for trucks should continue to grow for some time to come since increased use of motor-

(Turn to page 868, please)

Table 2
Showing Population Changes

Year	Population of U. S.	Families in U. S.	Persons Per Family*
1900	75,994,575
1910	91,972,266	20,255,555	4.5
1920	105,710,620	24,351,676	4.3
1930	122,775,046	28,500,000†	4.3†

* Note that these values are lower than the average of 5.3 persons per passenger car (estimate by the N.A.C.C. in 1929).
† Estimated.

Regularization of Output Leads Other

Material Handling, Metal Cutting Tools, Precision Grinding, Spectroscopic Analysis, Machining Cold-Drawn Steels, and Unemployment Relief were discussed at New York gathering + +

by Joseph Geschelin

REFLECTING today's economic problems, a round table discussion of stabilization of employment and the regularization of production was an outstanding feature of the annual meeting of The American Society of Mechanical Engineers held in New York last week. Other sessions of interest to automotive people were staged by the Machine Shop Practice Division, Materials Handling Division, and the Special Research Committee on cutting metals.

In Boston a group of prominent New England business men organized a study into the methods employed by American concerns to reduce seasonal slumps. Some of the results of this study were given by Edwin S. Smith, Director of Research, The Committee to Study Methods of Reducing Seasonal Business Slumps, in his paper, "Manufacturing in Advance of Orders in Seasonal Industries." Dividing the problem into three major parts, that of aiming for a more uniform sales demand, an attempt to get orders in advance of the season, and finally a more uniform production curve, the speaker chose to attack the problem on the basis of manufacturing in advance of orders to achieve a more level production curve.

Mr. Smith frankly stated both advantages and disadvantages of the method, chief of the latter being the danger of overproduction. In general, the difficulties in the way of manufacturing in advance of orders were found to be almost insurmountable except in the case of standardized products. One of the suggestions made by the speaker was the possibility of closer control of retail stocks as a means of regularization. No doubt there would be created an oversupply on the retailers' shelves at certain times. If this idea were practical it might be a decided help to certain automotive parts manufacturers.

The paper concluded by



P. P. Pratt, engineer from the Postum Co., Inc.

noting some of the industries which attempt to manufacture in advance of orders. In their case the danger of overproduction always lurks, but it can be controlled by careful forecasting.

Presenting the point of view of one of the stabilized industries, Harvey C. Knowles, general superintendent, Procter & Gamble Co., outlined their plan, which guarantees full time, full pay employment for 48 weeks. However, even in this staple and more or less stable industry it is sometimes necessary to carry a heavy inventory, entailing overhead burden in order to maintain their level of production.

An interesting community movement to relieve unemployment distress is typified by the Cincinnati plan which was described in "The Cincinnati Plan for Unemployment Relief," by Fred K. Hoehler, Director of Public Welfare, read and discussed in his absence by R. E. W. Harrison, engineering director, Cincinnati Grinders, Inc. The outstanding feature of the plan briefly summarized below is that it was put into action before the emergency existed.



C. E. Maynard, factory superintendent of the Fisk Rubber Co.

To summarize, the steps taken by Cincinnati in meeting the past winter's unemployment emergency:

1. A permanent committee was appointed long before any emergency existed, through which all efforts at stabilizing employment cleared, and where plans for meeting an unemployment emergency were set up in advance.
2. Definite effort was put forth through sub-committees to secure the acceptance by industry of the principle of providing work for as many as possible at reduced hours, if necessary.
3. A committee encouraged the starting of city, county, state, and national public works at a time when labor was plentiful.
4. A large committee secured as many temporary jobs as possible.

Topics at A. S. M. E. Annual Meeting

5. An industrial relief program was set up that provided necessary but non-competitive labor to heads of families at public and semi-public institutions; the wages were paid from a relief fund.



W. A. Becker of the Haynes Stellite Co. + +

6. A Committee on Transients handled the transient problem separately from the general unemployment problem.
7. A fairly well-equipped Employment Bureau made working agreements with employers of labor and kept business informed of the quantity and kind of labor available.

8. A relief program was planned in advance

with reasonable funds guaranteed the agencies responsible for relief giving.

Thought-provoking material was supplied by Dr. Royal Meeker, associate in economic research of Prof. Irving Fisher, in his clear, vigorous thesis, "Unemployment—Its Causes, Palliation, and Prevention." The causes, according to Dr. Meeker, may be grouped under two heads, 1—Maladjustment of production and consumption, and 2—Physical and mental incapacity of workers. Furthermore, the causes for industrial maladjustment may be expanded into four main heads, namely:

1. Lack of planning of production to meet consumption needs.
2. Changes in the general price level, which means changes in the purchasing power of money.
3. Unforeseen calamities, including marked overproduction of wheat, cotton, petroleum, and other commodities, as well as destruction of lives and property by earthquakes, floods, storms, famines, etc.
4. Technological improvements due to new machines, methods, management, and organization.



E. E. Gordon, who collaborated on "Cutting Tools" with Mr. Becker + + +

The speaker then summed up the three major policies which in his opinion mark an intelligent approach to the prevention of unemployment: (1) Planning production to meet estimated requirements of consumption; (2) stabilizing the buying power of money; (3) providing carefully planned unemployment relief. He is convinced that the solution to the problem of regularization of production demands close cooperation of all economic forces bringing together the employer, employee, and financial and political leaders.



W. A. Wissler, was another contributor from the Haynes Stellite Co. + +

The session of the materials handling division was featured by three papers showing the influence of automotive practice on other industries. However, the significant thing is the development of special methods in these industries which may in turn prove of great value to the automotive plant. For example, P. P. Pratt, engineer, The Postum Co., Inc., describes in his paper a comprehensive method of assembling carload lots of miscellaneous packages originating in four different sections of the plant.

At the Fisk Tire Plant a set of conditions have made it possible to effect remarkable economies through the development of special trucking equipment to supplement conveyors used in the manufacturing process. This was described in an interesting way in "Materials Handling Methods in the Fisk Tire Plant," by C. E. Maynard, factory superintendent, Fisk Rubber Co. The magnitude of the operation may be visualized from the statement that they employ 115 types of factory trucks.

A symposium on cutting metals which provided considerable spirited discussion brought together papers dealing with Cemented-tungsten-carbide, Haynes Stellite, and Tool-steel tools. Milling, boring and turning, cast iron and certain semi-steels was discussed briefly in "Haynes Stellite Cutting Tools," prepared by W. A. Becker, E. E. Gordon and W. A. Wissler. Much of this is familiar to the reader but the table shown gives some recent performance figures in automotive shops.

That three factors—design, steel, and treatment—govern the life of tools was demonstrated by A. H. d'Arcambal, consulting metallurgist, Pratt & Whitney Co., in "Tool-Steel Tools." His discussion included the evolution of the modern tools such as drills,

Milling Operations Showing Production With Haynes Stellite Tools

Part	Operation	Machine	Cutting speed, ft. per min.	Feed, in. per min.
Cylinder block....	Rough and finish mill top, bottom bearing cap slots, manifold and valve-cover pads	Line type	110	10.5
Cylinder block....	Rough and finish mill top, bottom, valve-cover and manifold pads	Line type	120	9
Crankcase	Rough and finish mill top and bottom	Drum type	120	18
Cylinder block....	Rough and finish mill bottom and valve-cover pad	Line type	110	8
Cylinder block....	Rough and finish mill top	Rotary	91	12
Cylinder block....	Rough and finish mill top and bottom	Drum type	92	17
Cylinder block....	Rough and finish mill top and bottom	Drum type	91	14.4
Cylinder block....	Rough and finish mill top and bottom	Drum type	104	13.8
Cylinder block....	Rough and finish mill ends	Drum type	102	12
Cylinder block....	Rough and finish mill ends	Drum type	110	15.5
Cylinder head....	Rough and finish mill top and bottom of cylinder head	Line type	90	11.5
Cylinder head....	Rough and finish mill cylinder contact faces	Drum type	124	9.3
Cylinder head....	Rough and finish mill top, manifold and cover pads	Line type	142	13.3
Cylinder head....	Rough and finish mill cylinder contact and surface	Rotary	86	13.5
Cylinder head....	Rough and finish mill top and cover side	Rotary	132	14
Crankcase	Rough mill top face	Line type	99	13
Crankcase	Rough and finish mill lower face	Rotary	111	15
Gearcase cover...	Rough and finish mill face (1 cut)	Line type	122	8
Crankcase	Rough and finish mill	Line type	109	9
Water manifold..	Rough and finish mill six pads	Double-spindle horizontal	172	24.3
Manifold	Rough and finish mill contact face	Double-spindle horizontal	126	13.8
Manifold	Rough and finish mill contact face	Single-spindle vertical	114	18
Manifold	Rough and finish mill contact face	Double-spindle horizontal	104	13.8
Bearing cap....	Rough and finish mill sides	Double-spindle horizontal	232	14
Clutch housing...	Rough and finish mill face and recess	Drum type	166	31
Cylinder head....	Rough and finish mill pump end	Drum type	225	28
Gearcase cover...	Rough and finish mill contact face	Double-spindle horizontal	166	15.5

reamers, milling cutters, etc., the metallurgy of the steels used, and the control of heat treatment. Among other things he left the valuable suggestion that since the design of a cutting tool is governed by the type of metal it is to cut, why not specify the type of metal when purchasing and thus get the advantage of the most favorable cutting tool conditions?

A large collection of slides illustrating some striking application of cemented-tungsten-carbide were a feature of the paper, "Cemented-Tungsten-Carbide as Applied to Cutting Tools," which was presented by L. J. St. Clair, manager, Philadelphia district, Carboly Co.

Among those participating in the discussion at this session were Roger Prosser, Coleman Sellers, 3rd, who took up the grinding problem, and Frank W. Curtis of Kearney & Trecker, who sent in a paper describing their new line of milling cutters with inserted teeth of cemented-tungsten-carbide.



A. H. d'Arcambal,
metallurgist from
Pratt & Whitney

An approach to another phase of standardization—that of surface finish—is found in, "A Survey of Surface Quality Standards and Tolerance Costs Based on 1929-1930 Precision-Grinding practice," by R. E. W. Harrison, engineering director, Cincinnati Grinders, Inc. He proposed a definite standard for measuring surface quality so that a given finish could be specified in much the same way as the tolerances on a dimension. In his work this has been

accomplished in the following way, according to the speaker:

"A finish-measuring device has been put into use, embodying an electromagnetic type sound detector or pickup as used in the better makes of electrically operated gramophones.

"This instrument is connected up with a radio amplifying unit and records minute vibrations caused by irregularities on the surface of the work to be inspected, reproducing them through a loud speaker.

"The contact with the work is made with a chisel-edged sapphire, and a millivoltmeter records the amplitude of a current which is directly proportional to the vibration, and which passes across the grid of a supplementary radio tube.

"Work which is relatively roughly ground produces a deep, harsh vibration in the loud speaker and a relatively large movement of the needle on the millivoltmeter scale. A finely ground piece of work produces a keen high note characteristic of minute vibration, and results in a relatively small swing of the millivoltmeter needle.

"From the foregoing description, therefore, it will be seen that there is available both sound and visual measurement on a definite scale to supplement the microscope and the naked eye.

"The instrument is extremely sensitive and particularly well suited to picking out that class of unsatisfactory work which, in the



R. E. W. Harrison
spoke on Precision
Grinding

everyday phraseology of the mechanic, is 'highly polished and deeply scratched.'"

In the discussion it was noted that the present method of measuring or calibrating finish might not be very reliable. However, the idea of standardization found general approval and it was agreed that refinement in the calibrating equipment would be developed as the idea took hold.

The detection and estimation of minute amounts of minor constituents in metals and the simpler alloys by spectroscopic analysis was discussed by Charles C. Nitchie, Bausch & Lomb Optical Co., in a paper entitled "The Application of Spectroscopic Apparatus to Industry." Mr. Nitchie showed the simplicity of the method and its adaptability to common industrial problems.

Another contribution to machine shop practice by Prof. O. W. Boston of the University of Michigan was found in his paper, "Machining Properties of



Prof. O. W. Boston
of the University
of Michigan + +

Some Cold-Drawn Steels," which presented general machinability data. Among his conclusions were the following: that machining properties of each steel depend upon chemical composition, heat treatment and degree of cold working; that the thrust curve seems to follow the Brinell curve almost exactly from point to point, and that the planing curve seems to follow the Brinell curve inversely from point to point. Data are presented concerning force required in planing, milling and drilling, and horsepower per cubic inch of metal per minute.

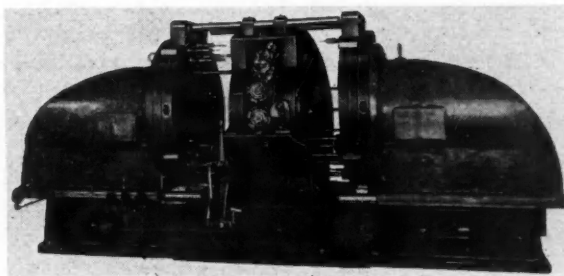
Machine Drills Simultaneously Holes of 13 Sizes

RECENTLY the Ex-Cell-O Aircraft & Tool Corp., Detroit, Mich., was called upon to design a machine for drilling and counterboring several radial holes in a drop-forged steel part. The part to be drilled has 13 holes varying from 3/16 to 9/16 in.

around the periphery. Not only are they unevenly distributed, but the depth varies, depending upon their location, and five of these are counterbored. By having more than one operation in several of the holes it was impossible to use a radial type of machine.

The photograph shows the finished machine for which Ex-Cell-O built the heads and fixture, the latter being located in the exact center of the machine. The work is located in the fixture by a three-point bearing and is clamped by means of an equalizing toggle operated by a spanner. Because of the irregular spacing of the holes, several extra stations were required in addition to the regular operating stations on the trunnion fixture.

While the trunnion is indexed 22 deg., the work is rotated 12 deg. on its axis. This is accomplished by means of a pinion on the fixture and a stationary ring gear on the bushing plate which brings each hole to its working position. Perfect alignment of the rotating



This Ex-Cell-O machine simultaneously drills 13 holes of various sizes and depths, counterboring five of them + +

fixture and drills is insured by means of a hardened and ground guide bar interlocking the stationary bushing plate and the rotating fixture. Due to its weight, the trunnion fixture is indexed by a crank, worm and worm wheel instead of by hand.

Each multiple head is full ball bearing and direct motor driven, being mounted vertically on the slides of a specially designed two-way hydraulic feed machine. The motors driving the multiple head are mounted in the slides supporting the multiple heads. The heads are approximately 6 ft. in diameter, so from this the overall height and length of the complete machine can be estimated.

The heads and fixtures are held in positive alignment by two large hardened and ground bars at the top of the fixture, which enter hardened and ground bushings at the top of each of the multiple heads. A hand control for starting and stopping the feed is conveniently located, while an emergency foot stop is also furnished and is shown directly below the hand control lever.

The base for mounting the multiple heads, fixture and motor equipment was built by the W. F. & John Barnes Co.

In Step With Diesel Engine Developments

British Building Automotive Engine Generating 100 hp. at

by M. W. Bourdon

Powerplant, built by the Associated Equipment Co., Ltd., is a six-cylinder design of 4.33 in. bore and 5.59 in. stroke giving a 630 cu.in. displacement

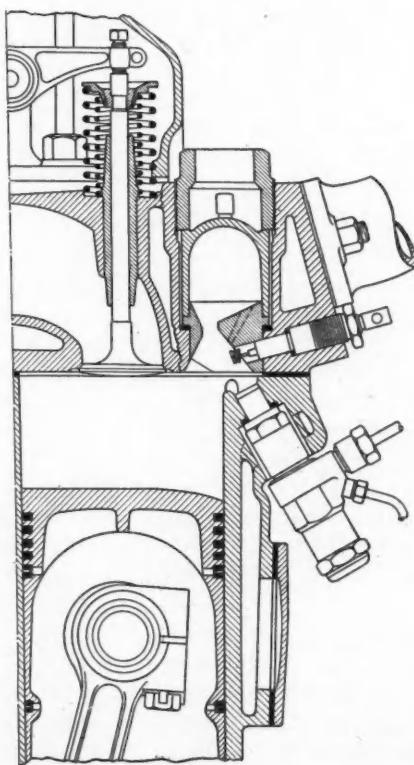
AN automotive Diesel engine operating at remarkably high speeds has been developed and placed in production by the Associated Equipment Company, Ltd., the manufacturing subsidiary of the London General Omnibus Co. As mentioned in a recent issue of *Automotive Industries*, a lot of 100 of these engines are now coming through the shops, and I am informed on good authority that twenty-five of them are to be shipped to the United States.

The engine is a six-cylinder design of 4.33 in. bore and 5.59 in. stroke (630 cu. in. displacement), and the peak of its power curve corresponds to a speed of 2500 r.p.m., at which speed over 100 hp. is developed. From that speed to 3000 r.p.m. the horsepower curve is practically level.

This undoubtedly remarkable speed and performance for an oil engine have been attained by utilizing as a basis the Bosch Acro system of combustion chamber design. As shown in the accompanying sectional view, the combustion space is divided into two parts; these are approximately equal in volume when the piston is at the top of its stroke, but are separated by a narrow throat or venturi. The upper part, termed the air cell, is located above and to one side of the cylinder bore

and communicates directly with the lower part, the latter consisting mainly of the space between cylinder head and piston crown, though there is also a small funnel-shaped area below the narrowest part of the throat. The fuel is sprayed upward and at an angle into the lower part of the combustion chamber, aimed directly toward the throat. A Bosch injector is used in conjunction with a fuel pump assembly of the same make.

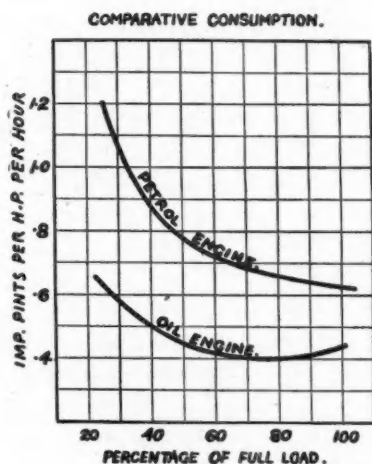
Below the throat leading to the air cell is an ignition plug to facilitate starting from cold. This consists of an insulated electrode terminating, inside the combustion space, in a coil of nichrome, which is brought to incandescent heat in a few seconds by a two-volt current prior to the use of an ordinary electric starting motor, though the latter is wound for 24 volts. As soon as the engine runs under its power, the current to the ignition plug is switched off; thereafter compression-ignition alone suffices at all



Cylinder and compression chamber of A.E.C. engine +

Heavy Oil 2500 r. p. m.

speeds from 300 r.p.m. to the maximum. A compression ratio of 15.5 to 1 is used and the compression pressure reaches about 520 lb. per sq. in. when the engine is hot.

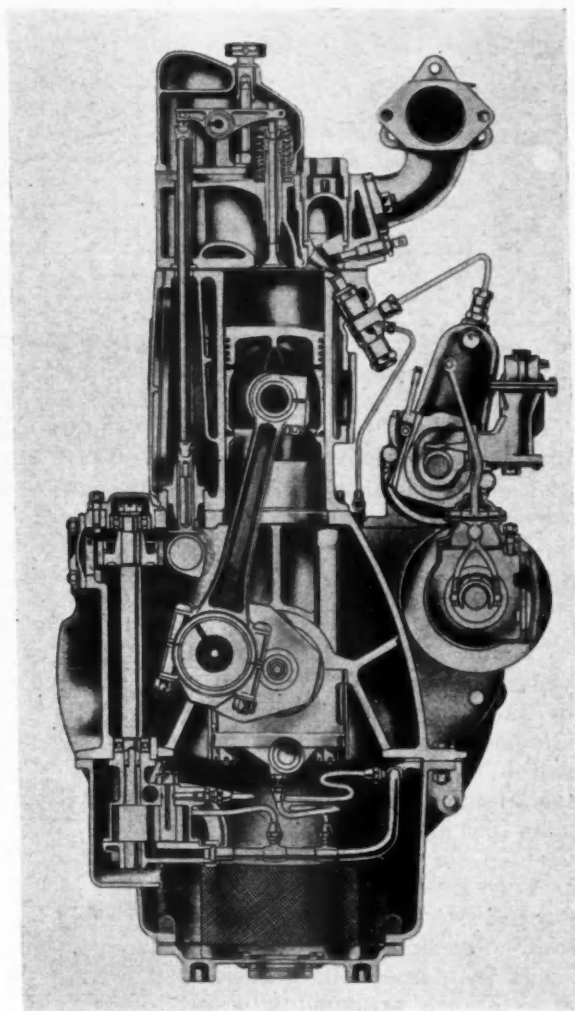


Fuel consumptions of gasoline engine and A.E.C. oil engine compared + + + +

a gasoline engine; in other words, it reduces what H. R. Ricardo has termed the "delay period" of an oil engine. This "delay period" is also counteracted by control of the "timing" of the fuel pump, a control by which the camshaft of the pump unit is "advanced" or "retarded" in relation to its driving shaft.

Approximately correct use by the driver of the pump or injection advance control is important; if an attempt be made to run the engine at high speed with the control retarded there is not only loss of power but a smoky exhaust is prone to occur. This injection control is associated with the Bosch fuel

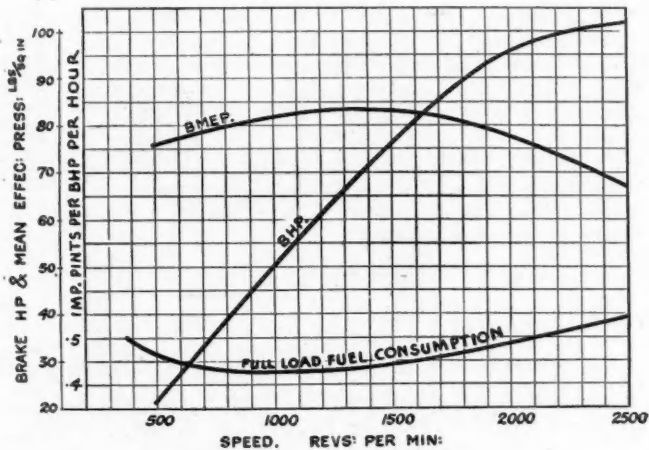
A highly important factor of the performance of this engine is that as the engine speed increases so does the rapidity with which the compressed air within the air cell returns to the main combustion chamber; similarly its turbulence increases at high speeds. This results to a certain extent in what can be likened to advancing the ignition timing of



Cross-section through cylinder

pump normally, but to suit the A.E.C. engine speeds—roughly 1000 r.p.m. higher than those of other oil engines in production—the range of advance is greater. Thus there is a 12-deg. variation of the pump camshaft (24 deg. of the crankshaft). The "retard" position represents fuel injection commencing at 10 deg. before top dead center; so, with full "advance," it commences 34 deg. before dead center. In other words, as with an ignition spark, injection at the highest speeds with full advance has been completed, mechanically, before the piston reaches the top dead center.

The Associated Equipment Co. in conjunction with the London General Omnibus Co. has been experimenting with oil engines of various designs and types since early in 1928, and it adopted the Acro system because it offered the greatest promise of development toward the desired end. The first engine to be tested was an old gasoline engine adapted to this system; when promising results became evident, a single cylinder engine was specially constructed for laboratory research, and it is on the results of innumerable experiments with this single cylinder unit that the design of the production engine is based.



Horsepower, b.m.e.p. and fuel-consumption curves + + + + + + + + +

This production engine is of such dimensions as to enable it to be used in A.E.C. truck and bus chassis already in production for a gasoline engine of similar power. It has an aluminum crankcase and sump, and block-cast iron cylinders; the latter unit is secured by the main bearing bolts extending through the top of the crankcase, so relieving the latter of stresses due to the gas pressure load. The detachable cylinder heads (with steel and asbestos gaskets) are arranged in two groups of three with pushrod operated overhead valves. The crankshaft runs in seven bearings and is naturally stiffer than that of the corresponding gasoline engine; but the weight has been kept down by large holes bored in the main journals and crankpins. The main journals are 85 mm. (approximately $3\frac{3}{8}$ in.) in diameter and the crankpins 75 mm. ($2\frac{15}{16}$ in.).

Pistons are of aluminum (British standard Y alloy); they have four compression rings and a scraper ring; on the air cell side the crown is slightly chamfered. As the load to be carried by each piston is as much as 7500 lb. under compression alone and nearly twice this figure under full load conditions, the piston pins, which bear directly in the aluminum and are clamped in the small end of the connecting rod, are of 40 mm. diameter. Connecting rods are of nickel chrome steel, the white metal being run directly into the big-ends. The valves are of silico-chrome, the material used for A.E.C. gasoline engine valves.

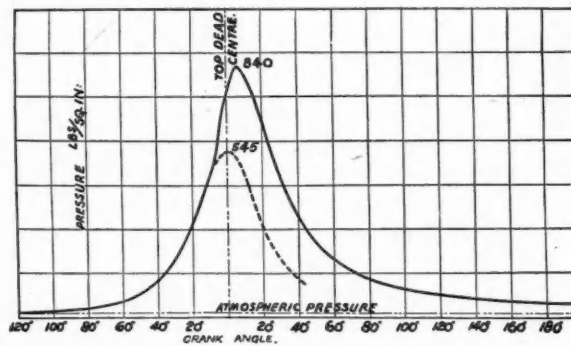
All main and crankpin bearings are lubricated under pressure and the camshaft, pistons and piston pins by oil spray. Low-pressure oiling for the valve rocker shaft is obtained through a device which "bleeds" a limited supply from the high-pressure system; the oil is fed to the interior of the hollow

rocker shaft at the rear end and reaches each rocker through radial holes drilled in the shaft. Surplus oil is carried down at the front end of the engine to serve for the gears driving the oil pump.

The camshaft and all auxiliaries are driven by a single triplex roller chain with automatic tensioning. All auxiliaries (except the starting motor) are fitted on the left-hand side to make them accessible with forward driving controls (the driver being on the right).

A governor for minimum speed is fitted. This is necessary partly to correct the difference in operating conditions between a hot and a cold engine, but also to cope with a peculiarity common to all oil engine fuel pumps. The peculiarity is that, for a given setting, the quantity of fuel discharged increases slightly as the speed increases. It will sometimes happen, on that account, that after an engine has been accelerated it does not decelerate with sufficient rapidity to allow of easy gear-changing, and this is one reason for the use of the minimum speed governor. The latter also insures that, when coasting, the fuel supply to the engine is cut off entirely when the speed falls below 300-400 r.p.m.

The water pump in front of the distribution casing and the governor and generator behind it are in line on the left side of the crankcase, running at $1\frac{1}{4}$ engine speed. The fuel pump drive is on the same side but higher. As stated, it runs at half engine speed and although made by Bosch, it has



Time-pressure diagrams of gasoline and oil engines + + + + +

a special camshaft to give the rate of injection determined as desirable by research carried out by A.E.C. An A.C. diaphragm pump is used to lift the fuel from the main tank and deliver it to the fuel pump at a pressure of about 3 lb. per sq. in.

The drive to the fuel pump from the distribution chain gear passes through a unit new to automobile engines, viz., an exhaustor or vacuum pump. This is needed, in the absence of an ordinary induction tract, to provide the vacuum required for the brake servo. It is a small rotary vane pump with an externally ribbed casing, and is driven positively by the engine. The suction side is connected to a vacuum tank of 10 in. diameter and 33 in. long, attached to the chassis frame under the bodywork. Air exhausted from the brake servo cylinder is passed into the crankcase through the base of the exhaustor, the latter being lubricated by splash through the discharge opening. A relief valve is fitted to limit the vacuum to 20-22 in. of mercury and avoid overheating. To avoid losing vacuum

when the engine drops to idling speed a check valve is fitted, this and the relief valve being incorporated in a single unit mounted on the exhaustor.

Naturally, endeavor has been made to keep down the weight of the engine as a whole. It weighs no more than a similar type of gasoline engine of the same piston displacement, though on the basis of weight per horsepower it is heavier. With all accessories and flywheel it weighs just under 1350 lb. or 14.2 lb. per b.hp. at the rated horsepower of 95.

Driving controls are almost identical with those of a gasoline-engined vehicle; the accelerator pedal actuates the fuel cut-off sleeve associated with the Bosch pump. The stroke of the latter, it may be recalled, is constant, the volume of fuel delivered being controlled by a rotatable sleeve with a helical slot. Tests made with a number of Bosch pumps by A.E.C. have shown that the maximum discrepancy in delivery volume by the six pumps of any pump outfit amounted to no more than .02 per cent. Injection into the cylinders occurs through a standard Bosch injector; this, it may be remembered, has a single outlet controlled by a conical valve with a parallel sided extension having only a slight clearance in the delivery orifice; this parallel extension serves two purposes: first, to effect better atomization and a wider spread of fuel spray, and, secondly, to prevent the formation of carbon deposit in the delivery orifice, a fault said to be associated with multiple spraying outlets in a capped end. Carbon deposit, A.E.C. experience shows, causes no trouble with this injector. The injection pressure ranges from 1200 to 1500 lb. per sq. in., the injector valve having a maximum lift in practice of only 0.050 in.

A preliminary batch of engines built to this design have been subjected to extended tests both by the A.E.C. and in the hands of transport operators, to

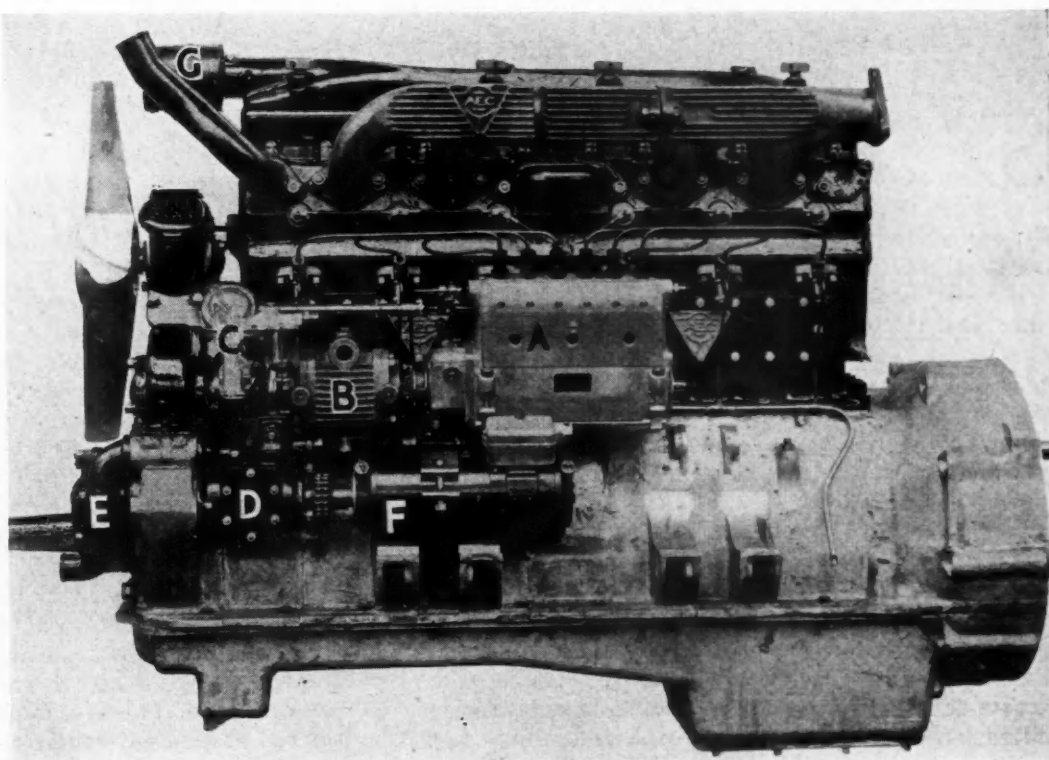
whom engines have been lent for test under service conditions in their existing chassis. Curves of power, consumption and other factors are reproduced herewith. As to road performance, a 6-ton truck run for many months gave an average oil consumption of 8.1 miles per United States gallon, which compares with an average of 4.2 miles per gal. obtained with the corresponding gasoline-engined truck.

The reason for this economy will be appreciated by reference to the consumption curves of the oil and gasoline engines at from quarter to full loads. It will be seen that whereas the consumption per b.hp.-hour of the gasoline engine increases continuously as the load decreases, that of the oil engine actually decreases slightly at first and after remaining practically constant over a considerable range, finally increases somewhat (from .4 to .65 pints per b.hp.-hour.) under very light loads. At quarter load, however, the consumption is only a little over half that of the gasoline engine. At the average load in normal service—about 40 per cent of full load—the consumption of the oil engine is about 60 per cent of that of the gasoline type. The A.E.C. oil engine will operate satisfactorily on any gas, oil or good grade Diesel oil, though on the former rather more power is developed.

A feature of this engine is that it is peculiarly immune from the "idling knock" associated with oil engines in general. When idling it is, admittedly, not so quiet as the corresponding A.E.C. gasoline engine; there is a slight "clatter" that is reminiscent of the noise arising from the four-cylinder heavy truck engines of two or three years back. This sound arises partly from the high compression pressure maintained at all loads and speeds, and partly from the fact that the operation of the minimum

Side view of A.E.C. Diesel engine—

- A, Bosch fuel pump
- B, exhaustor for vacuum brake servo
- C, A.C. fuel pump from main tank
- D, governor casing
- E, water pump
- F, generator
- G, A.C. cleaner on air intake



speed governor is more or less intermittent; "hunting" within narrow limits takes place while idling and disturbs the uniformity of combustion in all cylinders. The idling sounds may also be likened to a gasoline engine misfiring somewhat erratically at very low speeds with the ignition advanced a shade too far. But in comparison with what has been generally associated hitherto with automobile oil engines of the precombustion and open combustion chamber types, this A.E.C. Acro engine is surprisingly quiet when idling.

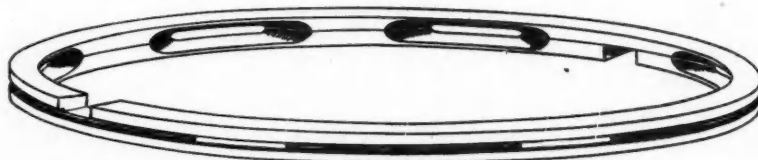
I write the above from personal experience, which also covers the behavior of the engine on the road. With conditions varying from open roads to dense London traffic, I covered many miles inside a double-deck bus, close to the driver. At low speeds and when accelerating from 400 or 500 r.p.m. to 700 or 800 r.p.m. the sounds and "feel" were again those of a gasoline engine with the ignition somewhat too far advanced; but there was nothing that the average person would consider objectionable or even would

realize as being different from the gasoline engine. At moderate and high speeds not even the most critical observer could detect any difference in running.

Inside the bus there was no exhaust odor, though I noticed a faint smoke when the engine was accelerated after the bus had been held up in a traffic block; but it was less than that issuing from adjacent gasoline-engined buses when they too moved.

A characteristic of the running that necessitates a slight variation from normal gear-shifting methods is that the engine decelerates very rapidly when the accelerator pedal is released and accelerates somewhat sluggishly from 300 to 600 r.p.m. There might be said to be an almost "flat period" in the acceleration curve between those speeds; not misfiring or any erratic operation, but merely a certain sluggishness relative to acceleration at higher speeds. The effect upon gear-shifting is that more time must be allowed for the engine to accelerate while the gear lever is in neutral during a change to a lower gear.

"Vacuum" Multi-Oil Ring Made in Halves



The ring as a single-slot, equalized wall-pressure oil ring

SUPERIOR PISTON RING CO., Detroit, has marketed a dual-purpose oil ring known as the "Vacuum" Multi-Oil ring. The new ring is cast in two separate identical parts and the slots are so flared from the inside and grooved on one edge that when the halves are put together it makes a single oil slotted ring with a continuous annular groove. The double oil slot ring is formed by simply reversing one of the rings, placing its back to the face of the other, yet maintaining the continuous annular groove.

Clogging or blocking of oil in the drain slots is eliminated, it is claimed, by the flaring or widening of the mouth of the slot on the inside of the "Vacuum" ring—the outlet being larger than the intake. The annular-grooved reservoir, however, is said to retain sufficient oil to lubricate the wall with an annular film, thus



Rear view of a section of the ring as assembled in the form of a double-slot unit + + +

assuring correct lubrication at top speed. Caking of carbon in back of the ring and in the piston grooves should be diminished by the action of the two sections which move independently.

An important feature of the Multi-Oil ring is that the "oval face" effect (common in ordinary oil rings) is diminished by the independent yet compensating action of the two component parts. Proper compression is maintained without sacrificing correct lubrication by the wide face contact. Equalized cylinder wall pressure is maintained by the principle of the "Vacuum" Multi-Oil ring which has the gaps opposite each

other, the lower pressure at the gap of one section being compensated by the higher wall pressure at the back of the second half. The "Vacuum" Multi-Oil ring is manufactured in different widths from 5/32 in. up.

JUST AMONG OURSELVES

Pretty Good For An Off Year

OVER 3,000,000 passenger cars and more than 500,000 motor trucks with a total retail value in excess of three and a quarter billions of dollars—that is the production and sales job which the automobile industry will have done in the twelve months ending Dec. 31, 1930. In addition, automotive plants will have produced well over two billion dollars worth of replacement parts and supplies to keep in operation the 35,000,000 vehicles now running throughout the world.

These huge figures are reminiscent of Andy's troubles with his income tax; but actually they constitute a record of the constructive achievement of the world's largest manufacturing industry during a year of depression.

Constructive Sales Work Needed

HIGH-POWERED salesmanship has been overdone in America, said J. D. Siddeley, British automobile manufacturer, at a recent meeting of the Institution of Production Engineers. The motor maker's comment was caused by the clamor for more pioneer salesmanship by British manufacturers made by another speaker at the same session.

Since we believe that Mr.

Siddeley is almost exactly wrong in his contention and that vastly increased salesmanship of the constructive sort will be needed by American automobile salesmen in 1931, we think Mr. Siddeley's remarks as reported in *The Engineer* deserve repeating.

Mass Production and Salesmanship

"MR. J. D. SIDDELEY said that too much has been heard of mass production," this publication records. "The world had become obsessed with it and was now suffering as a consequence. . . . There had been too much 'high-pressure salesmanship.' It had been too easy to sell because the customer was not asked to pay for the goods he had taken. Until the world had paid what it owed, we would have to be content with a very quiet period. There could in any country be only one or two organizations such as Ford, Morris and Austin. For the rest he would prefer to speak of high-class batch production, making the batch as large as the demand called for. High-pressure salesmanship had been made a god in America; it had been overdone, and he felt convinced that the old-fashioned method of this country (England) would prove to be the best in the end."

It occurs to us that the com-

pany or country which eschews vigorous salesmanship while its neighbor practices it might find itself even further behind in good times than in bad.

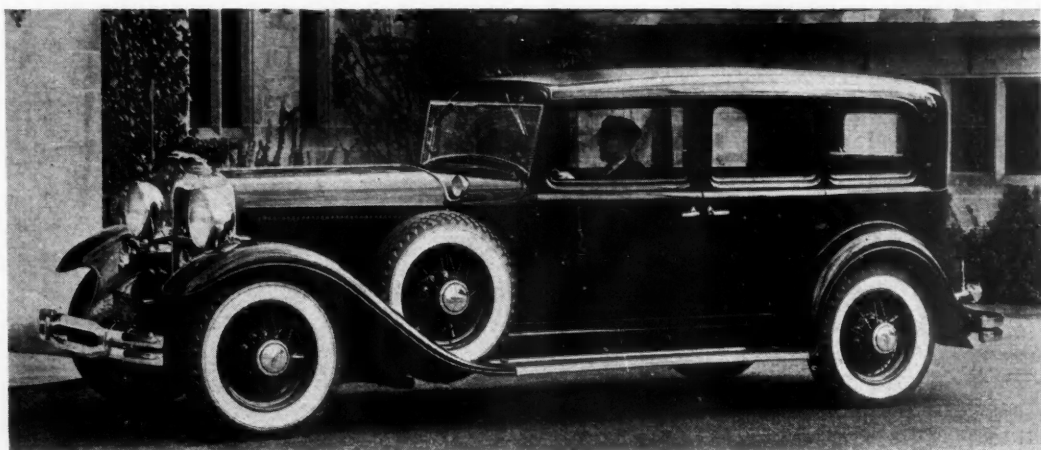
New and Used Car Stocks are O.K.

AS nearly as we can figure out new car stocks in the United States today average about 3-4 cars per dealer. Some have lots more, of course, but many must have less. While an average of this kind doesn't mean much in any specific sense, it does indicate that new car stocks by and large are in fair shape even considering the low rate of sales.

Average for used car stocks in the hands of passenger car dealers—that is, the total number of used cars in stock divided by the total number of car dealers—shows about 11-12 cars per dealer—and they aren't moving as fast as the new ones on the average.

We haven't had time to get out the slide rule to do our guessing about 1931 yet, but these figures alone incline us strongly to the belief that 1931 passenger car production can't exceed that of 1930 by very much and still leave dealer stocks of new and used cars in reasonably good condition. That opinion is subject to revision without notice, but it sticks pretty firmly in our mind right now.—N.G.S.

The new Lincoln seven-passenger sedan has free wheeling while its four-wheel braking system is operated by either hand or foot pedal + + +



Generator and Starter Are Separate Units on the New Lincoln Models

SOME additional details concerning the new Lincoln have been made available following the exhibition of the new model at the New York Salon. The cylinder dimensions of $3\frac{1}{2}$ by 5 in. have not been changed, and the increased power (120 instead of 90 hp.) appears to be due entirely to refinements in design. By doing away with the exhaust-jacketed intake manifold, the incoming charge is allowed to enter the cylinders at a lower temperature, and hence in greater quantity, and the back-pressure on the pistons during the exhaust stroke is reduced. Moreover, the lift of the inlet valves has been increased. The generator and starter are separate units, which is a new departure for Lincoln. It is stated that the generator is "driven by a second pulley on the camshaft." A Stromberg dual downdraft carburetor is centered over the cylinder blocks, each block being served by a separate jet. Radiator tubes are of flat shape and are set at an angle for maximum cooling effect, and the radiator is provided with shutters which are operated automatically by thermostat.

The bodies are 4 in. closer to the road than previously. More than one-half of this was gained by the adoption of a drop frame; one-half an inch by the use of road wheels 1 in. less in diameter, and the rest by mounting the body on brackets on the outside of the frame below the top, instead of setting them on the frame. Frame side rails are of $\frac{5}{32}$ in. stock, have a maximum depth of 9 in., and are reinforced at the rear section. Four heavy tubular cross-members are used, and the central cross-member is of box-section and reinforced with gusset plates.

Rear springs are 62 in., front springs 42 in. long, and Houdaille double-acting hydraulic shock ab-

sorbers are used all around. The front pair are mounted at the ends of the main front cross-member, to prevent interference with the shock-absorber action by twisting of the frame side rail.

As pointed out in our previous reference to the new Lincoln, the braking system comprises merely the four-wheel brakes, which are operated either by pedal or hand lever. The cross shaft is said to be extremely rigid, and the whole system is so designed that failure of any part of the linkage cannot completely incapacitate the brakes. Connection from the cross shaft to the rear-wheel brakes is through pull rods, and to the front brakes, partly by pull rods and partly by steel cables incased in armored conduits, the use of cable connections permitting of a large steering lock without interfering with the brakes. All brakes are individually adjustable directly at the wheel by means of a screw driver.

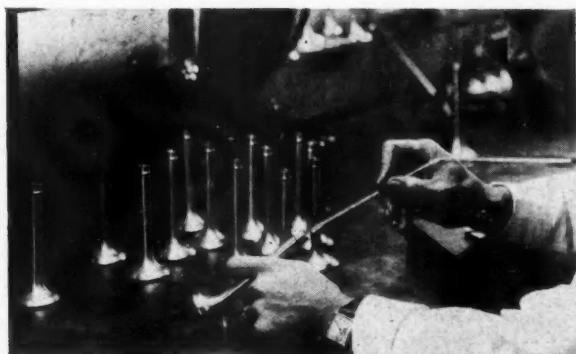
The most important change in some respects is the adoption of a free-wheeling unit, which is combined with the transmission, the latter also incorporating a silent intermediate gear (helical gears). The free-wheeling device is a small revolving unit mounted on the transmission shaft, and consists of two members, one within the other, the inner member sliding on the transmission shaft. The outer member connects through teeth with the transmission shaft. Between the two are eight rollers, each in a wedge-shaped slot.

The new Lincoln line includes both custom and standard body types. In the standard group there are eight types, including a seven-passenger touring car, four-passenger phaeton, five-passenger coupe, five-passenger sedan, town sedans of the two and three-window types, a seven-passenger sedan and a seven-passenger limousine.

Hollow Stem Valves Used in Record-Breaking Engine

It is generally realized that in refueling endurance tests of airplanes the test is most likely to come to an end through engine failure, and in the engine itself it is certain parts on which stresses are concentrated that are most likely to be the direct cause of failure. Among the most highly stressed parts of an air engine are the exhaust valves, and if these come through a record-breaking endurance flight without giving any trouble, it is certainly a matter for justifiable pride on the part of the manufacturer thereof.

The Challenger engine of the Curtiss Robin plane, which made the refueling endurance record of 647 hr., 28 min. and 30 sec., was fitted with valves manufactured by the Thompson Products Corp. when the record was established. The intake valves were made of Nitralloy G steel containing 0.33-0.43 C., 0.40-0.60 Mn., 0.04 max. P., 0.20-0.50 Si., 0.04 max. S., 1.50-1.80 Cr., 0.15-0.30 Mo., and 1.00-1.35 Al. The valves were forged, and the forgings were annealed, machined and ground to the proper dimensions, approximating those of the finished valve. The piece was then polished, washed and placed in a nitrid-



All valves were tested to see that the ends had been properly closed + +



After the record endurance flight of more than 647 hr. the valves were inspected and found to be in excellent condition + + +

ing furnace, where it was subjected to the action of ammonia gas for 90 hr. Excess material was left at the low end of the stem, which was removed after the nitriding treatment and before the stem was threaded.

Before nitriding, the inlet valves had a scleroscope hardness of between 40 and 50; after nitriding the hardness was 90-100 scleroscope, and the hard case had a depth of 0.010-0.020 in. The tip of the stem was then drawn to show a hardness of 75-85 scleroscope, to eliminate the extreme hardness which the nitriding treatment imparts, so that the blows of the valve tappets would not cause chipping off of the hardened case.

The exhaust valves were made of Thompson Special No. 2 nitriding steel, which contains 0.45-0.60 C., 0.65 max. Mn., 0.03 max. P., 0.035 max. S., 1.0-2.0 Si., 7.0-9.0 Cr., 0.40-1.00 Mo., and 0.25-1.00 Al. Aluminum is incorporated in this steel to facilitate the nitriding process.

After the exhaust valves had been forged, the forgings were annealed, hardened all over, and drawn to a scleroscope hardness of 40-50. The heads were then drawn back to the annealing hardness in order to remove any forging strains that might otherwise be removed later by operating temperatures, thus resulting in warpage of the head. The valves were then ground to finish size, except for a nubbin of excess material which covers the portion to be threaded, and they were given a low-temperature normalizing treat-

ment to eliminate any incidental grinding strains.

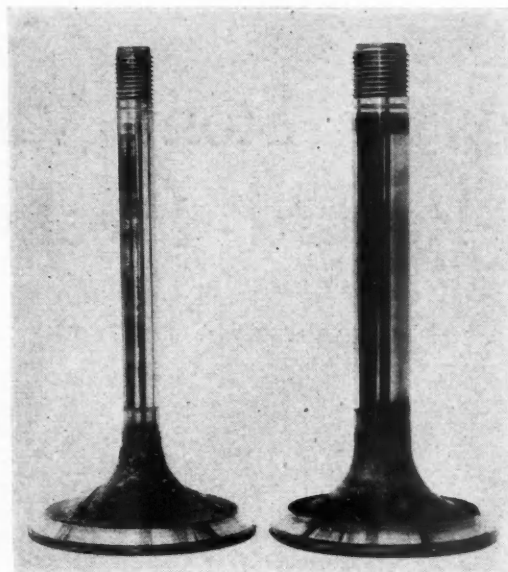
The stem of this exhaust valve is hollow, and is closed by extruding the end. Since there is a possibility of slight leakage through the core after extrusion, and consequent nitriding of the inside of the stem, all exhaust valves are tested to see that the end is properly closed. They are then given the 90-hr. treatment in the nitriding furnace, after which they show a case from 0.010 to 0.020 in. deep and have a hardness ranging from 90 to 100 scleroscope. The nubbin is then removed and the stems are threaded. The tip end of the valve is drawn back to 75-85 scleroscope to prevent chipping from tappet action. It should be noted that in the case of both exhaust and intake valves the threads are not nitrided and consequently are not brittle.

Considering the matter of stem design, which is of extreme importance in connection with aircraft exhaust valves, it is essential that the stem be strong enough, particularly at the neck section, to withstand the strain of continuous opening and closing of the valve at high speed. Also, in order to wear well, the stem must be large enough in diameter to provide sufficient bearing surface. In air-cooled engines such as the Challenger the stem also is the means of conducting heat from the valve head to the guides, where it can be dissipated to the air.

It is a simple matter to make a valve with a solid stem which will meet these requirements, but the weight factor also must be considered; as the weight of the valve is increased, a heavier spring is required to close it in the time available, and the hammering action on the seat, as well as the wear on the tip of the stem, is increased.

A compromise is made by drilling out a stem of comparatively large diameter. This gives sufficient heat-conducting area, ample bearing surface and a strong neck section, without making the weight of the valve prohibitive. By swaging the tip closed, as mentioned, three different advantages are gained, as follows: The retainer neck section is solid, reducing the chance of failure at that point; no plug is required for the tappet to act on, and the interior of the stem is protected from the action of the ammonia, hence the stem is not rendered dangerously brittle.

We are informed that when the valves were removed from the Challenger engine after the record flight their



Here is shown a comparison of the standard and hollow stem valves

appearance was excellent. The stems had a beautiful glaze and showed no evidence of scratches or wear, and the seats also were bright and without signs of pitting. There was no carbon on the seat of the valve, but a ridge of carbon had formed on the under side of the head at the edge of the seat. This is believed to have been due to oil being thrown by the engine onto the under side of the head, which burned there and hardened in ridges as a result of vibration of the valve on closing.

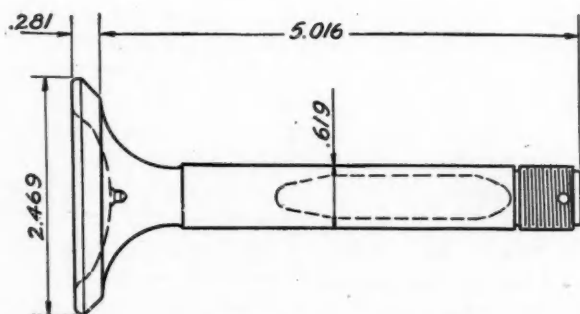
Measurements of the stem taken at the neck, middle and tip were within blueprint limits. The same was true of the overall length measurement, showing that no stretching had taken place. A check of the head diameter proved that no "cupping" had occurred, and the seat run-out was under 0.001 in. No measurable wear had occurred on the tips.

Passenger Car Production Gages Industry's Future

(Continued from page 855)

ized highway transportation here has reflected increased highway construction, larger population and an improvement in design which has been constantly extending the range of usefulness of motor trucks. These developments in transportation should serve to offset any immediate decrease in exports, although the many foreign markets which are still practically untouched offer extensive possibilities for truck sales just as they do for the continued export of passenger cars.

There is, too, a world-wide interest in highway engineering and it may reasonably be expected that new road construction throughout the world will gain considerable impetus during the next decade.



The hollow valve stem has a solid neck and is as light in weight as one with a smaller stem + + + + +

Needle Bearings Offer Advantages in High Speed Automotive Engines

The needles of this type of bearing roll or turn about their respective axes only under exceptional circumstances + + + + + + +

SEVERAL years ago a so-called needle bearing was brought out in Germany, and a brief description of it appeared in these columns at that time. At first glance the bearing appears to be a plain roller bearing making use of roller of very small diameter. On closer consideration it is found, however, that there are fundamental differences between the conventional roller bearing and the needle bearing, because the latter operates without any cage or guide, and its needles roll or turn about their respective axes only under exceptional circumstances.

The needle bearing offers particular advantages for certain applications in high speed engines, as on crankpins, where ordinary anti-friction bearings cannot be used because of the very large increase in the centrifugal force on the big end of the connecting rod which would result therefrom.

This bearing has been under development for a number of years and is now being supplied regularly for various uses in the mechanical industries, but chiefly in the automobile industry. Several articles on it have appeared recently in both German and French papers describing its construction, principles of operation and applications, and the following details are taken from a paper presented to the French Society of Automobile Engineers by M. Pitner, engineer of the firm manufacturing these bearings.

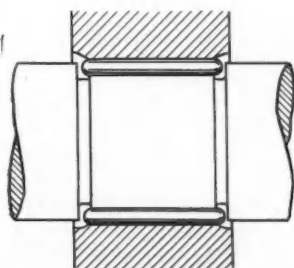
The needles of these bearings are not guided by a cage but are merely held endwise by shoulders. In operation the needles form a sort of sleeve which turns at a speed which is much less than that of the moving part of the bearing. The bearing, of course, is filled with lubricant. Suppose that the bearing begins to operate under a certain load. The needles and the raceway are in direct contact,

without an intermediate oil film, and under the effect of friction between the needle and raceway the former begins to turn or roll. This, however, lasts only for a moment, because as soon as the rolling motion is started, oil enters between the needle and the raceway and forms a film. Owing to the large number of needles between which the load is divided, the unit pressure on them is not sufficient to cut through the oil film once it has been established, and the film therefore remains. The needles are now completely surrounded with oil, and between adjacent needles there is a body of oil in the form of a triangular prism with curvilinear sides and a relatively small volume, as compared with its surface area.

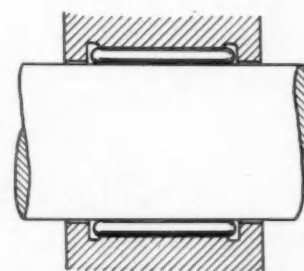
Under these conditions the needles are subjected to two forces—(1) the force of shear in the oil film between the needles and the raceway of the moving part, which tends to cause them to roll, and (2) the force of friction of the needles against the prism of oil imprisoned between adjacent needles, which tends to prevent them from rolling. The latter force takes effect on practically the entire surface of the needle and therefore predominates, so that the needle does not turn around its axis. In operation, the wedge effect between the needle and the raceway maintains the oil film.

Thus the assemblage of needles forms a sort of intermediate sleeve, similar to a floating bush, which has been used in aircraft and motorcycle engines, truck axles, etc., to reduce the velocity of shear by dividing the shear between two surfaces, so that the amount of heat generated at each is only half as great.

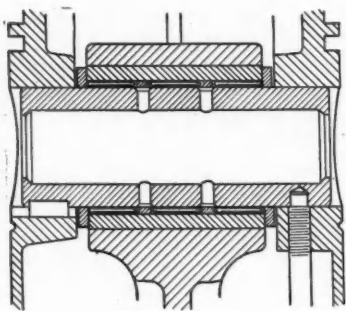
The operation of these floating bushes is not always in accordance with theory. Sometimes the motion is confined to one of the surfaces,



Shaft recessed for needle bearing + +



Bearing mounting surface recessed for needles + + +



Three series of needles
on piston pin of Diesel
engine + + + +

the effect of the increased friction the needle begins to roll, the same as the rollers of a roller bearing. The needle, of course, in spite of its small mass, does not get up to speed instantaneously. As regards the lubricant which is forced out from between the surfaces in contact, it passes to that side where the pressure diminishes most rapidly; it does not flow out axially, but laterally into the spaces between needles, into which it is wedged, so to speak. Capillarity and inertia prevent it from flowing out endwise, during the very short periods occupied by these phenomena. At such moments the load is carried not only by the needles along their lines of contact but also by the part of the lubricant between needles. The bearing surface is then continuous in a sense, and the unit loads do not become excessive, the effective load-carrying surface varying automatically with the load.

In case of momentary overloads, the cushion of oil existing between the needles and the raceway does not disappear immediately, and in disappearing it cushions the shock. The fundamental principle of the roller bearing is that a cylindrical roller bears on the raceway with such a high unit pressure that no oil film can be maintained and that the roller must of necessity turn around its own axis. Moreover the spaces between adjacent rollers are too large for the effects of capillarity and molecular adherence to be at all pronounced. It is also necessary that the rollers be accurately guided, while the needles, which have rounded ends, are not guided but are given a minimum end play of 0.002 in.

That there is no trouble from seizure of the bearings due to skewing of the needles, whereas even slight skewing of

and it is for this reason that the floating bush has not come into general use.

Now let us consider what happens when the condition of equilibrium in the bearing is disturbed, as by a sudden increase in load. The film between the needle and the raceway is then cut, and under

rollers causes gripping, is explained by saying that this gripping is due to the very high friction resulting when there is metallic contact and sliding must occur; with the needle beating, owing to the film of oil present between needles and raceway, there can be no gripping even if the skewing is considerable. In fact, the needles float on films of oil between the two raceways, and therefore can readily right themselves again when parallelism with the axis of the bearing has been disturbed.

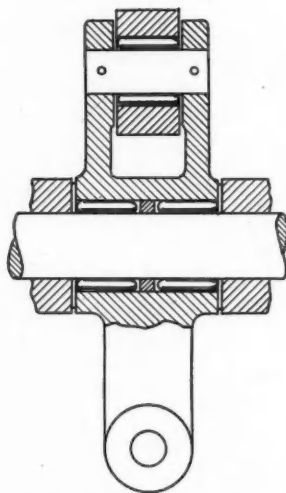
Where design considerations make it advisable, separate raceways can be dispensed with and the needles placed directly in the ground bore and the ground shaft. It is only necessary that these surfaces be of sufficient hardness, viz., 64 to 66 Rockwell, which is the hardness of case-hardened steel carburized to a depth of 0.032-0.040 in. Hardened steels with a tensile strength of about 280,000 lb. p. sq. in. can be used, and nitrided steels are particularly suitable for the purpose, on account of their slight distortion in heat-treating.

The needles are made in diameters of from 0.080 to 0.160 in. The advantage of the bearings in permitting the use of high specific loads has been referred to already. M. Pitner stated that in bearings on the piston pins of aircraft engines loads as high as 7800 lb. p. sq. in. had been carried, and loads as high as 3400 lb. p. sq. in. are carried regularly at speeds as high as 5000-8000 r.p.m.

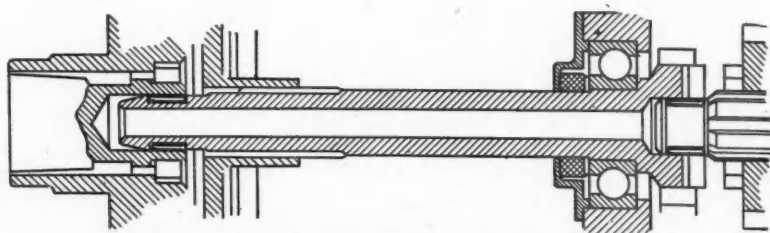
It is possible to split the bearing, as would be necessary in a connecting rod for a multi-cylinder engine, for instance. The bearing should be split in a plane through its axis, at right angles to the shank of the rod, and it is, of course, essential to joint the cap in such a manner that it must remain absolutely parallel with the other half.

As regards the efficiency of needle bearings, since there is practically no rolling motion in them, one would expect that to be of the same order as the efficiency of a plain bearing rather than that of an anti-friction bearing. M. Pitner points out that the efficiency of plain bearings is remarkably high if they are assured of a complete oil film. The efficiency of a plain bearing drops, of course, when metallic contact is established at any part, and it is difficult

to prevent this from happening, particularly in a large bearing. In the needle bearing, as soon as metallic contact occurs between the needles and the raceway, the needles begin to roll and thus to prevent sliding.



Needle bearings on
shaft and in roller
of fuel-valve rocker
for Diesel engine



Needle bearings on pilots of clutch and transmission shafts

Guggenheim School of Aeronautics Has Installed Engine-Testing Laboratory

Air speed of 90 to 100 m.p.h. can be obtained while the compact arrangement of the equipment permits supervision of the tests by a single person + + +

A LABORATORY equipped for testing both air-cooled and water-cooled aircraft engines and intended for both instruction purposes and for research has been installed in the Daniel Guggenheim School of Aeronautics at New York University. The general layout of the plant, including the dynamometer, the control panels and the cooling system, is shown in the plan view drawing reproduced herewith. A couple of interiors taken in the laboratory are also reproduced. The engine-testing laboratory occupies 880 sq. ft. of floor space on the ground floor of the school building, adjacent to the wind tunnel and close to a completely equipped machine shop.

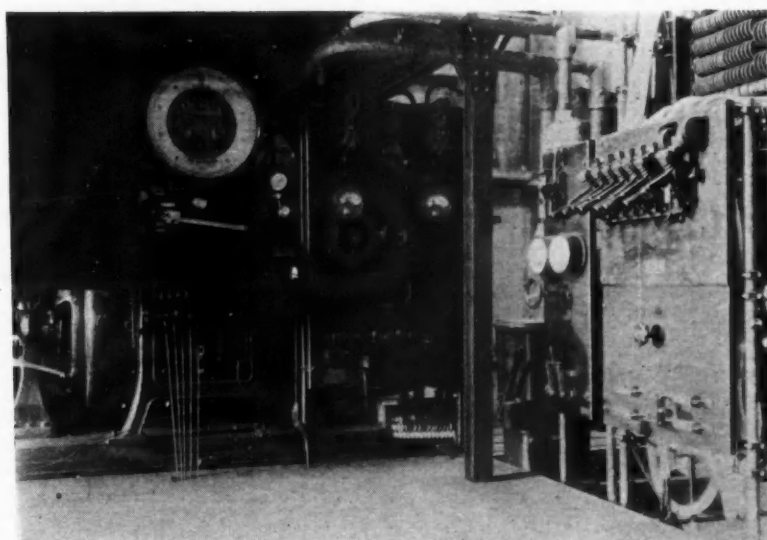
At the present time the equipment of the engine-testing laboratory consists of one 300 hp. G.E. electric cradle dynamometer, a 240-volt d.c. motor-generator set, and a Buffalo duplex conical blower driven by a 175 hp. d.c. motor. The cradle dynamometer, as usual, has an arm 21.008 in. long, so that the horsepower is obtained by merely multiplying the scale reading by the speed in r.p.m. and dividing by 3000.

When air-cooled engines are being tested, air from the blower is blown against them for cooling purposes. This air enters through the lower halves of two adjacent windows, leaving the upper halves for the admission of light to the test room. The axis of the double-inlet blower being parallel to the wall, makes for a compact arrangement of the whole unit and a simple drive. The air is discharged onto the engine cylinders through a grid, the grid members extending part way

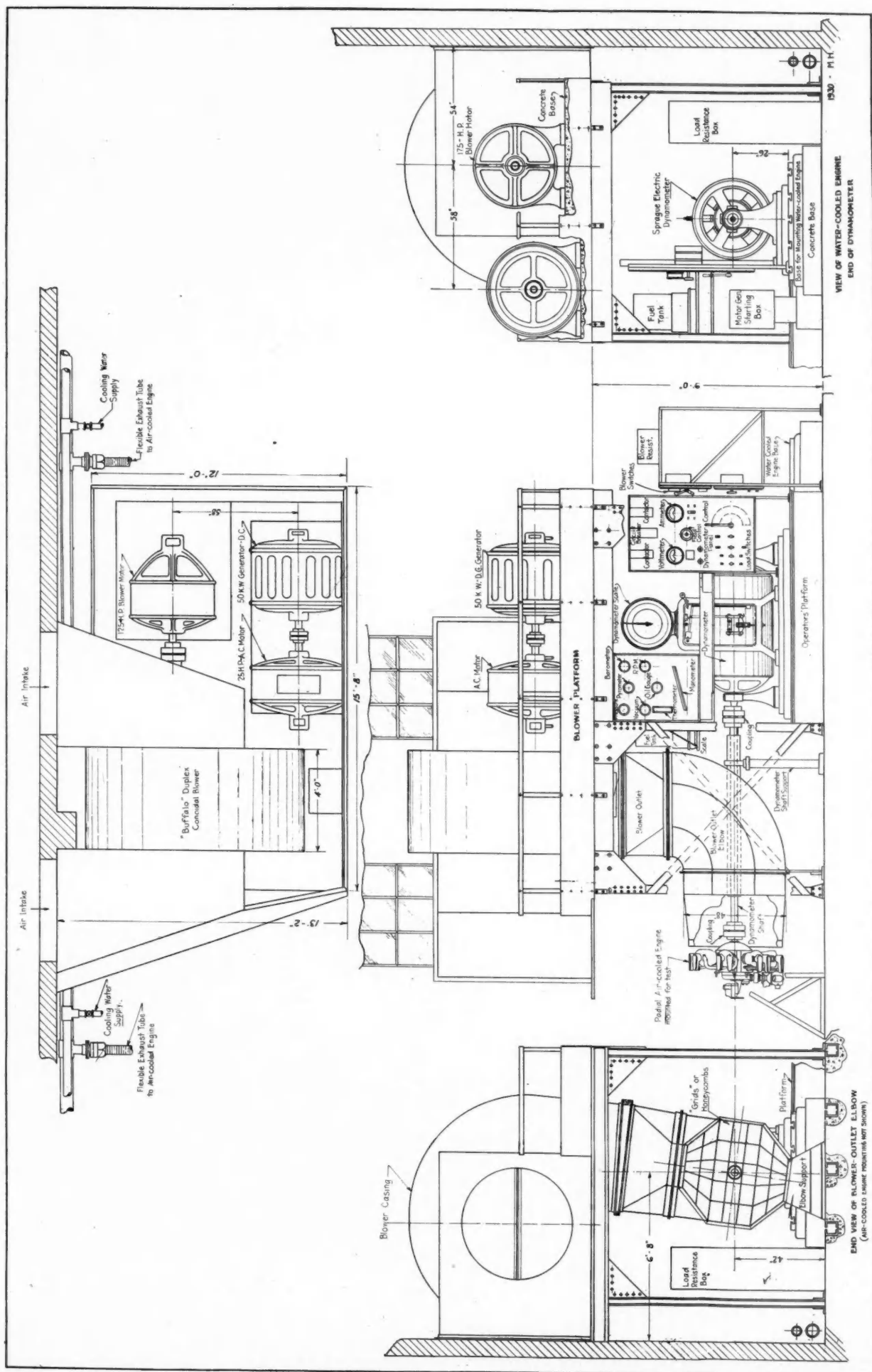
through the elbow, this being necessary in order to assure uniform air delivery over the entire surface to be cooled. Air speeds of from 90 to 100 m.p.h. can be obtained. As the floor space available was rather limited, a very compact arrangement of the units had to be aimed at, and the arrangement chosen has proved quite satisfactory, permitting supervision of the tests by a single person.

Since no direct current was available in the building, a motor-generator set to furnish such current was installed, direct current being needed for starting and motoring the dynamometer and the blower. When tests are made of very large air-cooled engines, for which neither the motor-generator set nor the dynamometer alone furnishes enough power for cooling, the two can be connected in parallel.

The dynamometer is so arranged that it can have engines connected to it at both ends, and one end is designed for connection to air-cooled and the other for connection to water-cooled engines. Electric current generated in the dynamometer during engine tests is carried through flexible cables to resistance boxes, where the electric energy is dissipated in heat. This energy can be used also for driving the blower motor.



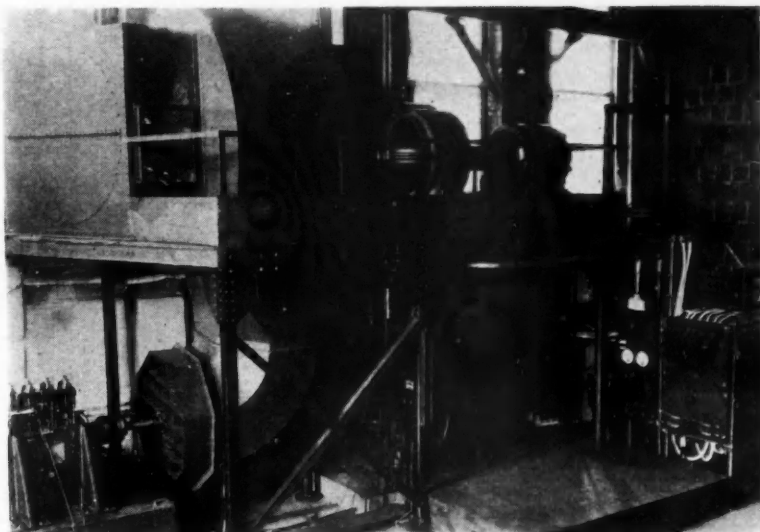
The arrangement of the dynamometer and the various control panels with the operator's platform in front is shown in this view + + + + +



As an aid toward space economy the blower, blower motor and motor generator set are mounted on an overhead platform 9 ft. above the floor. This platform is of steel and concrete construction and is therefore quite heavy, which tends to reduce vibration. The whole construction is stiffened by diagonal braced in both horizontal and vertical planes.

Electrical instruments and control panels are so arranged that the testing installation can be operated with a small personnel. The dynamometer scale is located on the front of the dynamometer itself, at a convenient height, and the control panels with their switches are located to the right of the scale, so that a person can read the scale while manipulating the switches. Other instruments, such as thermometers, tachometer, throttle and spark controls, are located in front of the dynamometer. Apparatus for measuring the fuel consumption and a manometer for determining the pressure of the air as it leaves the blower are also nearby. Exhaust gases are carried from the exhaust manifold of the engine through a short flexible metallic hose to the nearest connection of a pipe permanently mounted on the wall. This pipe leads to an electric "pump" which discharges the exhaust gases into the chimney and which serves as a muffler at the same time.

Temperature measurements are made by means of mercury thermometers and thermo-couples. The thermo-couples are connected to the milli-voltmeter through two ten-point switches, hence temperatures at numerous points of the cylinder barrels and head can be taken with a single milli-voltmeter.



The layout of equipment in the engine-testing plant was designed to economize space + + + + +

Air flow to the carburetor is measured by means of an orifice meter and corrections are made for deviations of temperature and barometric pressure from standard conditions. The rate of flow of air for cooling purposes is determined approximately by noting the reading of a static pressure tube mounted in the wall of the air duct.

Among auxiliary equipment available may be mentioned a large overhead traveling crane, a forge, and the machine shop already referred to. Aside from engine testing the laboratory equipment can be used for studying the characteristics of carburetors, intake manifolds, spark plugs, fuels and cowling of engines.

American Standard Submitted for Woodruff Keys

A PROPOSED American standard for dimensions of Woodruff keys has been submitted to the American Standards Association for approval. The standard, which was prepared by an A.S.A. committee under the sponsorship of the A.S.M.E., comprises a series of 27 keys of various thicknesses and of radii of curvature varying from $\frac{1}{4}$ to $\frac{3}{4}$ in. This series is said to cover approximately 90 per cent of all requirements.

In the early stages of the committee's activity considerable interest was shown in the matter of "tightness of fit," and there appeared to be wide variation in the industrial demands. Automotive interests then made careful experiments to determine tolerances which would in the majority of cases give what is known as a "sticking" fit. They found that the limits of the key, the keyslot and the keyslot cutter must be

very carefully controlled to produce the desired results. They also found that for certain shafting or arbor materials, the number of teeth in the keyslot cutter affected the rate of cutting and also, to some extent, the quality of fit of the key in the slot. Upon reviewing the results of these tests, the committee decided to include in the standard both the fine and coarse tooth series for each of the cutter diameters.

A notable advance has been made in the designation of the standard Woodruff Key series. Instead of using an unrelated series of numbers and letters, a system has been developed whereby each key is designated by two digits, the first representing the nominal width of the keyslot or cutter in units of $\frac{1}{16}$ in. and the second the nominal diameter of the keyslot or cutter in units of $\frac{1}{4}$ in.

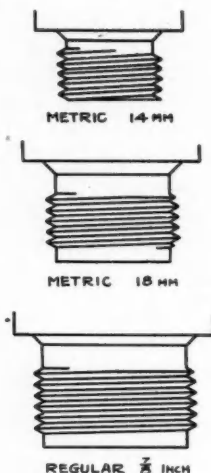
NEW DEVELOPMENTS—AUTOMOTIVE

AC Metric Spark Plugs

METRIC spark plugs of 14 millimeter thread known as AC type K-12—something new in the industry—are being used on the new Nash Twin-Ignition 880 models.

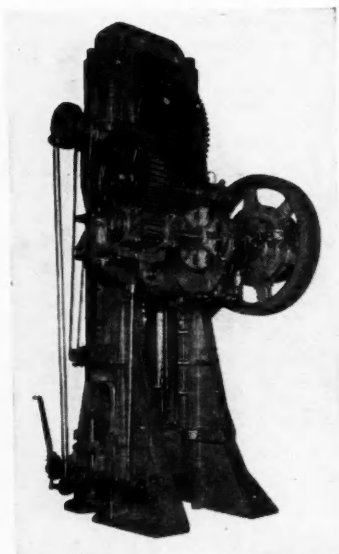
This size plug, introduced by AC Spark Plug Co. after several years of experimenting, has a wider heat range than spark plugs of the present standard size, according to Hector Rabezana, chief spark plug engineer of the AC Company.

The accompanying illustration shows how the 14 millimeter compares in thread size with the regular $\frac{7}{8}$ in. and the regular metric.



Bliss Long Stroke Reducing Press

FOR redrawing long shells of brass, copper or aluminum at greatly increased speeds, E. W. Bliss Co., Brooklyn, have brought out a mechanical power press with a new type of drive. This



machine is the No. 906 long stroke reducing press with balanced gear drive. It has a 36-in. stroke and operates at 18 strokes per min. The drawing speed of the new press is 170 ft. per min. at 18 strokes per min.

In this press the twisting moment of the crankshaft is said to be eliminated by applying the driving power to the

point where the cheeks would be on a regular crankshaft. In place of the cheeks are two large steel gears connected by a crankpin 18 in. from the center line of the twin gears. These gears are force fitted to journals which rotate in long bronze-bushed bearings at the point where regular crank bearings would ordinarily be mounted.

The press is of the built-up frame type, with shrunk-in tie rods, double geared and equipped

with a full automatic friction clutch with both foot treadle and hand lever control, so that the press may be operated by hand in setting and testing dies. The clutch is arranged so that the slide can be stopped or started at any point of the stroke independently of the full automatic mechanism.

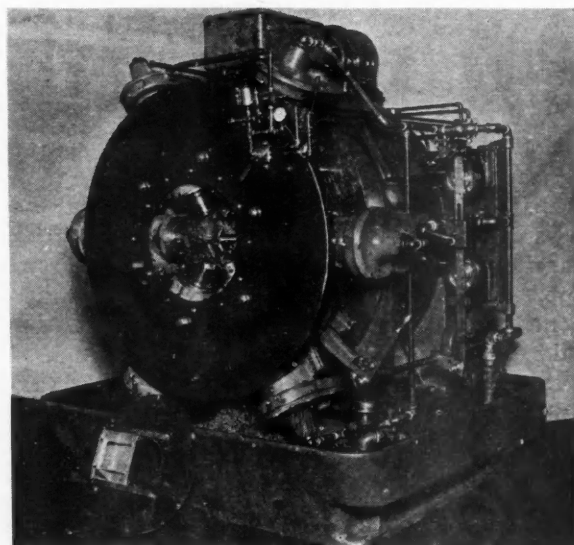
Motor drive is 40 hp. at 900 r.p.m. The capacity at midstroke is about 15 tons. Floor space 90½ x 99 in. Approximate weight 41,000 lb.

Multiple Turning Machine

HERE is a machine designed by the Reed-Prentice Corp., Worcester, Mass., for turning three-way differential spiders. It can be adapted also for machining four-way spiders or work of similar nature. The feed and indexing mechanisms are hydraulically operated by means of one standard oilgear pump independent of the main drive. The main drive is through a 15 hp. 1200 r.p.m. standard motor operating all six spindles simultaneously.

The operating cycle is as follows: The piece is set into the special jaws of the Logan air chuck and when the chuck is closed the lever at the lower right-hand side of the machine throws the oilgear feed mechanism into operation. An interlocking mechanism between the air chuck mechanism and the oilgear mechanism makes it impossible to start the feed of the machine until the air chuck is closed.

The three roughing spindles have rapid traverse and the rough turning feed is automatically thrown in. When the rough turning operation is completed the rapid traverse again operates, withdrawing the spindles, thus completing the roughing operation. The three finishing spindles have rapid traverse to the work, automatically throwing in the turning feed and withdrawing rapidly with rapid traverse. At the end of the cycle the feed automatically stops.



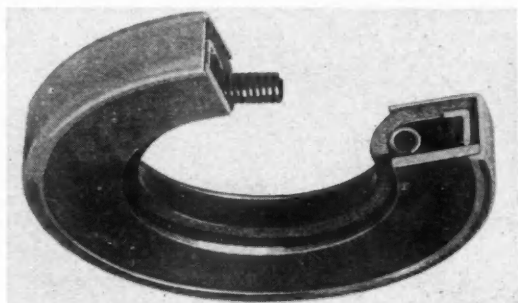
PARTS, ACCESSORIES AND PRODUCTION TOOLS

Between the roughing and finishing operations the air chuck mechanism carrying the work is indexed automatically by the oilgear mechanism from the roughing to finishing operation. A coolant pump or pipe connections to the main line oil system can be furnished. Cutting compound is piped to the end of the spindle and feeds down through to the turning tools directly on the work.

The total weight of the machine is 8150 lb. exclusive of motor.

"Perfect" Oil and Grease Retainer

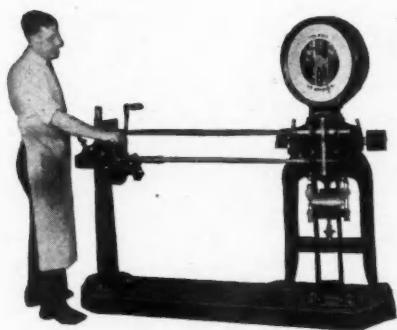
A NEW booklet just off the press describes the patented, self-contained leather oil seal, manufactured by the Chicago Rawhide Mfg. Co.,



Chicago, Ill., and lists the dimensions of the stock sizes made for use with shafts from $\frac{1}{2}$ in. to 12 in. in diameter. Among the advantages claimed for the product are the security with which the leather packing member is locked in the assembly and self-aligning features. Economy is stressed since the simplicity of merely pressing the "Perfect Oil Seal" into a recess provided in housing or bearing retainer results in reduction in cost.

Steering Gear Testing Auto-Check

A TESTING device for steering gears is being announced by Toledo Precision Devices, Inc., a subsidiary of Toledo Scale Co., Toledo, Ohio. The Auto-Check (as the device is known) indicates the physical effort required to operate the gear and thus enables proper adjustment to be made. The play of the steering wheel is also readily determined, and the angular movement on



each side of center of the drag link arm is indicated.

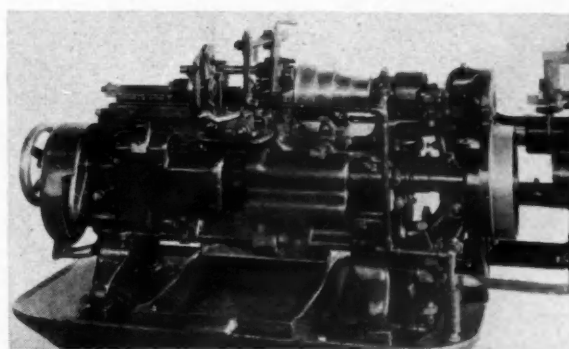
In the operation of the Auto-Check, the housing of the steering gear is first fixed in a quick-

operating clamping device on the machine. Then the free end of the steering-wheel shaft is engaged in a socket connected by gearing to a force-measuring and indicating instrument. When in this position, turning the crank will show how much effort is required on the steering wheel to turn the steering gear to any position. Various adjustments may then be made to bring the sector into proper mesh with the worm, to obtain the desired resistance to turning, the proper wheel play, and correct drag link arm movement.

This device is so designed that it can be made to fit any type of steering gear.

B. & S. Roller Feed and Timing Mechanism

THE Brown & Sharpe Mfg. Co., Providence, R. I., announces a new attachment called the roller feed and timing mechanism to be used with Brown & Sharpe automatic screw machines. On jobs where the pieces are of considerable length this equipment is said to save time, as one operation of the roller feed is sufficient to feed the piece the required distance, eliminating the multiple feedings with feeding fingers otherwise necessary. The end of each new bar is positioned at a point to permit trimming to remove the waste, leaving only a suitable amount for chucking at the last end.



To determine the position for trimming, a swing stop with control mechanism is used. This stop functions only once to each new bar. The operation of the swing stop is controlled by a ratchet wheel operated by a pawl which is moved by the rear cross slide each time a piece of work is cut off. The ratchet wheel has a number of teeth which is a multiple of the number of pieces available in each 10-ft. bar. As an example, a ratchet has 44 teeth, and as 11 pieces are contained in each bar, four operating dogs are necessary. These dogs are mounted on the side of the ratchet wheel and when brought to a position allow the swing stop mechanism to function.

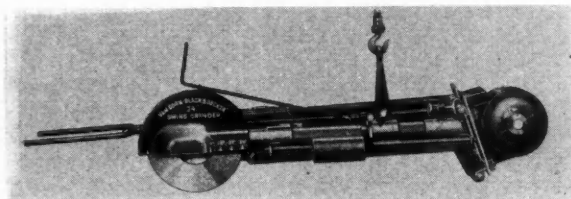
NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

Multiple-Speed Swing Grinder

ANNOUNCEMENT is made by Black & Decker of their new swing frame grinder with multiple speeds. Many of the features found in the other Van Dorn, Black & Decker swing frame grinders have been included in this machine. This grinder has three speed changes and is available with maximum wheel sizes of 12 in., 16 in., 18 in., 20 in. and 24 in., and a primary cutting speed of 6000 or 9000 surface feet per minute.

The adjustable steel wheel guard is arranged to make the various speed changes. As the wheel wears, the guard is moved back the proper dis-



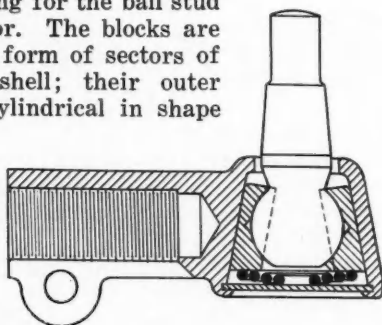
tance each time which causes the changes in speed to be made. Provided with the guard is an arrangement which prevents the operator from failing to make the speed changes as the wheel wears.

There is a visual device on the guard which enables the shop foreman to tell at a glance whether or not the operator has made proper guard and speed changes to compensate for wear on the wheel.

Balcrank Compensating Concentric Tie-rod

ANEW steering tie-rod with self-adjusting connector has been placed on the market by the Cincinnati Ball Crank Co. under the name of the Balcrank compensating concentric tie-rod.

The connector comprises a forged socket within which there are two sliding blocks of hardened steel that surround and form a spherical bearing for the ball stud of the connector. The blocks are of the general form of sectors of a cylindrical shell; their outer surfaces are cylindrical in shape and there are corresponding cylindrical surfaces on the inside of the socket, in which the blocks are lodged. The axes of the two cylindrical surfaces on the inside



of the socket are inclined toward each other. Each of the cylindrical segments is formed with a spherical depression on its inner side, in which the ball of the ball stud is lodged. A conical spring is located in the lower part of the socket, being supported by a cover or retaining plug for the socket and pressing against the two bearing blocks. It is obvious that the pressure of the spring against the blocks maintains a uniform pressure at the bearing surfaces of the ball and automatically compensates for any wear that may occur on these surfaces.

An advantage claimed for this new connector is its greater safety, since it is impossible for the rod to drop off even if parts of the connector should come loose. The hole through the socket is large enough only to allow the stud of the ball to pass through. The joint is rendered dust-proof by inserting a felt washer and a metal cup between the socket and the eye of the steering arm.

These tie rod connectors are furnished either with sockets which are permanently assembled and serviced as a complete unit, or with sockets which can be disassembled and have individual parts replaced. An advantage of the self-adjusting feature is that any adjustment which may take place as a result of wear will not change the center-to-center length of the tie-rod. It is said to be impossible for the bearing blocks to turn even slightly in the socket, thus making it impossible for the oil hole to become closed.

Elkaloy Electrode for Spot Welding

ELKALOY, a proprietary metal, developed by Elkon, Inc. (Division of P. R. Mallory & Co., Inc.), Indianapolis, Ind., is now available in the form of an electrode material for manual spot welding applications. Elkaloy is a special alloy in no way related in its physical characteristics to Elkonite now used in the electric resistance welding field. The new alloy is approximately 40 per cent harder than the hardest drawn copper and is said to last three to five times longer.

New Aero Compass

PIONEER INSTRUMENT CO., division of Bendix Aviation Corp., has developed a new straightway air compass having practically no overswing in the action of the indicator. The weight of the magnetic element and its friction have been reduced by removing the usual circular compass card and this has been replaced by a spider carrying two broad parallel bars treated with luminous paint. The spider supports the magnets, made of cobalt steel, and is pivoted on a lapped steel pivot above the center of gravity floating in a sapphire cup jewel. The magnetic

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

element is contained in a cylindrical bowl filled with a water-clear liquid which serves to dampen the motion against oscillation while at the same time retaining the sensitivity of the magnet. The



bowl is fitted with a glass-covered ring on which are indicated the cardinal points, with intermediate points indicated by numerals. Two parallel lines, which are radium illuminated and of the same width as the lines of the magnetic element, cross the center of this ring in a north and south direction. The ring can be turned so that the desired heading will coincide with the lubber-line. It is then clamped into position and the ship will head in the right direction when the lines in the magnetic element are parallel with the lines across the ring.

Rockford Multiple Spindle Drilling and Tapping Machine

THE Rockford Drilling Machine Co., Rockford, Ill., manufacturers of heavy-duty, high-production, multiple-spindle machines, announces a new combination multiple-spindle drilling and tapping machine, the functions of which are controlled hydraulically by an oilgear pump. The double-end arrangement of this machine illustrated has been in operation for several months drilling and tapping large tractor gearcases and the user reports no tap breakage.

This particular machine has 19 spindles at one end, and 17 spindles at the other end, with a fixture for locating and clamping. First a batch of parts are run through the machine having 17 holes drilled on one side, then 19 holes drilled on the other side, all simultaneously. Now the machine is set for tapping, which is accomplished by positive engagement of levers, and the same

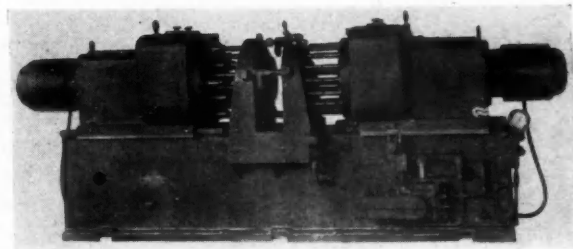
batch of parts are again run through the machine, at which time 19 holes are tapped on one side and 7 holes tapped on the other.

The spindles of this machine are built up into a separate unit fitting into the front compartment of the drive heads proper, as shown, becoming practically an integral part thereof, and the main driver of the head proper connects with the main drive spindle of the spindle-unit. This spindle-unit feature is of very great advantage, as it permits interchanging spindle-units originally furnished with machine with other spindle-units having a different number of spindles and on different centers.

Both heads are coupled together through rack and pinion, so that both work simultaneously. To start the cycle, the operator engages the control lever, after which both heads rapid traverse forward to a point where drills are about to start working, then automatically slow down to proper feeding rate (which rate can be varied), drill to a predetermined point, and then automatically rapid traverse to the rear or starting position and stop, ready for another operation cycle to be engaged.

With the machine arranged for tapping, the automatic features are much the same, but after the taps have traversed the proper distance and the heads are about to start their return traverse, the reverse rotation of spindles also takes place. After the heads have returned to the rear or starting position, the spindles automatically change over to right-hand rotation.

For safety the sensitiveness of the machine is such that the resistance encountered by a tap in case of breakage would be sufficient to trip the



head into reverse feed and of course the spindles into reverse rotation, bringing the heads back to the rear or starting position again without damage to the taps or machine.

The machine described can be furnished in several sizes, and in many arrangements, such as single-end horizontal, double-end horizontal as illustrated, three or four-way horizontal, vertical, or combinations of horizontal and vertical. Machines of this type can also be furnished for single operations only, such as for drilling only or for tapping only.

Automotive Oddities — By Pete Keenan

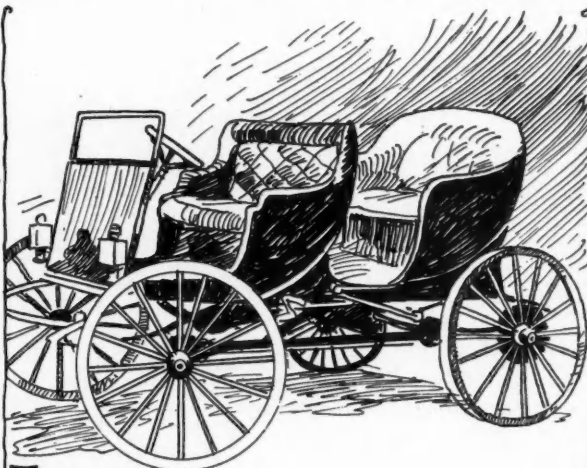
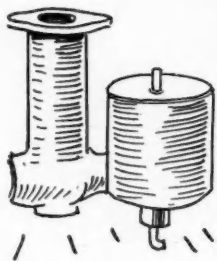


LUIS FIRPO
WHO KNOCKED DEMPSEY
OUT OF THE RING, IS NOW
A SUCCESSFUL AUTOMOBILE
DEALER IN ARGENTINA.



THIS OLD 1919 CAR REPLACED
100 HORSES, hauling mail and merchandise
from Selwyn to Boulia, Australia. 130 Miles. Loads average 2 tons.
Although the road is very bad the service is regular, Rain or Shine.

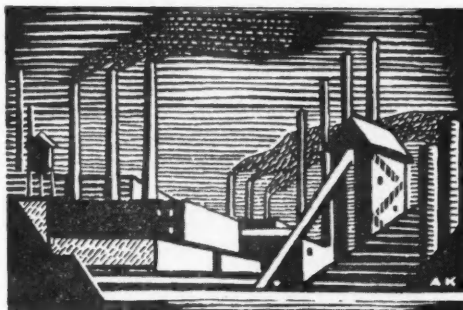
A \$15 DUTY WAS
PUT ON CARBURETORS
TO PROTECT A 3-MAN
CONCERN IN AUSTRALIA.



THIS 30 YEAR OLD RELIC WAS RECENTLY TRADED-IN
FOR \$27.50 THE DEALER REFUSED \$300.00 FOR IT.



AL WILSON, NOTED STUNT
FLIER, WAS BADLY INJURED
FALLING OUT OF BED.



NEWS OF THE INDUSTRY

Two Durant Units May Split-Off

**California and Canadian
Companies Expected to
Manufacture Own Car Types**

NEW YORK, Dec. 11—Division of Durant Motors, Inc., into quasi-independent manufacturing units having no connection with Durant Motors of Michigan is foreseen in well-informed financial circles, following conferences this week between W. C. Durant and officials of the Canadian and California plants involved.

Rumors that the Durant Michigan organization has purchased the Pacific Coast territory from Durant Motors of Oakland, Calif., which formerly manufactured and sold Durant cars in the territory under a 20-year contract, and would directly compete against a new car to be manufactured by the former California organization were confirmed unofficially, but on unquestionable authority.

A new company, it was said, will replace the California organization, under the leadership of Norman de Vaux, who was president of Durant Motors of California. Colonel E. J. Hall, vice-president of Hall-Scott Motor Car Corp., an American Car & Foundry Motors subsidiary at Berkeley, Calif., is also interested in the new structure, according to reliable information.

Whether the new de Vaux car will use Hall-Scott engines is not known. Hayes Body Corp. has been mentioned as the possible source of bodies for the new car.

It is understood that no definite plans have been formulated by Durant Motors of Canada, of which Roy D. Kerby is president. According to one source, the Canadian company may be purchased from Durant Motors, Inc., the holding organization controlled by W. C. Durant, on the basis of the minority interest in the Canadian company assuming certain obligations for which the stock interest of Durant Motors, Inc., in the Canadian organization is pledged.

Separation of the Canadian and California companies from Durant Motors, Inc., would restrict W. C. Durant's operating interests in the
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The News Trailer

By Herbert Hosking

Plymouth is presenting some swell stuff on the radio . . . week of Dec. 21 there will be a French program during which M. Paul Painleve, war-time premier . . . will preem, we suppose, and Mlle. Germaine Corney, of the Opera Comique . . . will vo-de-deolala * * * Oshawa Blue Devils, a Rugby team composed of G.M. of Canada employees, is cleaning up the local league and got a half holiday to win the final game of the season . . . that's all right, they serve cricket and play tea in some of the English plants * * * the biggest day's traffic in the history of Chicago yellow cab was handled the day of the Army-Notre Dame game (Sat., Nov. 29) . . . carting away disabled Army players? * * * Henry Ford smiled and said nothing when Illinois Manufacturers' Association presented him with gold medal for contributions to advancement of modern American civilization . . . chorus to the drama furnished by Arthur Brisbane and B. C. Forbes also guests * * * taxes paid on Alabama automobiles are proportionately about five times as great as taxes on other property, says F. W. Gist, statistician of the Alabama Dept. of Agriculture . . . Mr. Gist reads the Literary Digest, we presume, but then we're always presuming * * * Glen Douglas has received a Willys eight sedan from the hands of George Graham, v.p. of W.-O. as winner of a salesman's sweepstake contest . . . Douglas beat all W-O salesmen and dealers in nation-wide sales contest * * * Fords were under tents in a traveling show held in Birmingham and Montgomery, Ala. * * * Federal truck has a trick new method of driving away the heavy boys . . . looks like a game of leap-frog, but it works * * * Dr. Fritz Von Opel, inventor of the rocket car, predicts that flights from Berlin to New York will be made in 3 hr. at a 30-mile altitude within two decades . . . rocket planes, of course . . . Dr. Von Opel is general manager of the Opel Motor Works, the G.M. subsidiary in Germany * * * Germans have a new process for making cotton from iron * * * corticem adstrictum pice demovit amphorae. Horace, Ode III 5. Metoo.

Martin Midget Car Production Begins

**Is Second Small-sized
Vehicle to Enter U. S.
Market Within Year**

WASHINGTON, Dec. 11—Manufacture of the Model B Martin midget, a car of 70-in. wheelbase and weighing 750 lb., to sell for \$250, f.o.b. Hagerstown, has been started in the plant of Moller Motors, Inc., at Hagerstown, Md., according to James W. Bryan, president of the Martin Motor Car Co., which controls patents and sales rights on the new vehicle. The car is the invention of James V. Martin of the Martin Aircraft Corp., Garden City, N. Y., and its experimental features were described several months ago in *Automotive Industries*.

The Model B is the first of two types which will be placed in production at the Moller plant for Martin. Present plans call for the immediate production of 3000 units which will be immediately placed in the hands of dealers in the United States, Canada, Mexico and Cuba, Mr. Bryan told a representative of *Automotive Industries* today.

The engine in the Model B is a four-cylinder Continental, with a thermosiphon cooling system and develops 29.5 hp. at 3400 r.p.m. It is being manufactured exclusively for the Martin car by the Continental Motors Corp.

The new car, which is a coupe, contains 47 in. of shoulder room, which compares favorably with other small passenger cars on the American market, according to Mr. Bryan. It is designed to accommodate two-three passengers and is said to be capable of 70 m.p.h. The manufacturers will guarantee to the purchaser fuel mileage in excess of 35 per gallon, and the specially manufactured tires are guaranteed by their manufacturer for ordinary usage up to 25,000 miles.

Within a few months production will begin on Model A of the Martin car, according to Mr. Bryan. This will be a lighter version of the Model B and will be powered by a four-cylinder air-cooled engine. It will sell for \$200.

C. W. Adler, former chief designer
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Men of the Industry and What They Are Doing

United Elects Mead

George J. Mead, chairman of the executive committee of the Pratt & Whitney Aircraft Co., has been elected vice-president of the United Aircraft & Transport Corp. and will be in charge of the newly organized experimental and research division of that corporation.

Mr. Mead was born at Everett, Mass., Dec. 27, 1891, and attended the Massachusetts Institute of Technology from 1911 through 1915. His early experience in engineering was gained when he was employed by the Sterling Engine Co. of Buffalo, N. Y.

G.M. Executives Return

Graeme K. Howard, vice-president and general manager of General Motors Export Co., who started out for a trip to overseas operations of the corporation on July 5, will return this week to attend important sales conferences to be held during the latter part of the month. Most of the time he was abroad Mr. Howard spent in Australia and New Zealand.

Harry Tipper, vice-president and general sales manager, returned for these conferences last week from a trip which he has been taking through Europe since August. He is expected to return to Europe before the first of the year.

H. B. Phillips, vice-president and Far East regional director, and E. C. Riley, vice-president and European regional director, have both arrived recently in this country for these conferences.

Studebaker Shifts Two

W. E. Betts, manager of Studebaker's Cleveland branch for the past six years, has been appointed manager of the Los Angeles branch. M. E. Hewins of the Los Angeles branch replaces Mr. Betts as Cleveland branch manager. Prior to Mr. Betts' connection with the Cleveland branch, he was advertising manager of the Studebaker Corp. at South Bend.

Studebaker Names Savage

Claire R. Savage has been appointed manager of the Detroit wholesale branch of Studebaker Corp. of America, succeeding J. R. Ackerman, who has been transferred to New York City. The new location of the Detroit Studebaker wholesale branch is 12345 Woodward Ave., where a new parts depot has also been established recently.

Lewis Talks to Service Men

H. Bertram Lewis, vice-president of Commercial Credit Co., spoke Dec. 12

at the regular monthly meeting of the Automotive Service Association of New York, Inc. His subject was personnel, morale and management.

Best Leaves Austin

C. A. Best, sales manager American Austin Car Co., has resigned from that position, effective Dec. 15, in order that he may spend the next few months in the Southwest in an effort to restore his daughter to good health. She has been very seriously ill for some length of time and following a recent operation her condition has been such that Mr. Best feels the best thing to do is to devote the next few months entirely to a quest for her health.

When asked as to his views of the future prospects of the Austin company, Mr. Best stated that he is today more enthusiastic about the future prospects of the company than ever before. The dealers' acceptance of the new panel delivery job and of the Bantam Roadster has been remarkable, he said, and he feels that the Austin Company stands every possibility of establishing itself as one of the important factors in the American automotive industry.

Mathis Arrives in U. S.

E. V. C. Mathis, president of the French company manufacturing the car bearing his name and president of American Mathis, Inc., arrived in New York Dec. 9 on the Ile de France for a visit, to complete the launching of the program for American Mathis. He expects to be in this country about two months, during which time the first of the American-made cars manufactured in the Durant plant at Lansing will be introduced at the time of the New York show.

Mr. Mathis expects to begin building up his dealer organization during the time of the show when dealers will first be afforded an opportunity to see the car which he is to produce. Mr. Mathis also expects while here to complete arrangements for securing the necessary American share of capital for the company.

Chrysler Heads Committee

NEW YORK, Dec. 11—Walter P. Chrysler has been named to head the committee of the National Automobile Chamber of Commerce, which will be in charge of arrangements for the N.A.C.C. banquet at the Hotel Commodore on Jan. 6. Other members of the committee are: A. J. Chanter, Pierce-Arrow; W. J. McAneeny, Hudson; L. A. Miller, Willys-Overland; I. J. Reuter, Oldsmobile; Paul W. Seiler, General Motors Truck, and William Robert Wilson, Reo.

Col. Ayres Sees Slow Recovery

Believes '31 Car Sales
Will Only Equal '30

CLEVELAND, Dec. 10—Colonel Leonard P. Ayres, vice-president of the Cleveland Trust Co. and internationally-known business expert, predicted a slow recovery from the present depression in his annual talk before the Cleveland Chamber of Commerce on Dec. 9. Beginnings of recovery will be evident in the spring, he says, but normal will not be reached during the year. He stated that the present depression was much more severe than anyone expected and it will take rank as one of the important major depressions of our entire economic history.

Three different reasons which might account for the depression are the international race to increase production and capture markets; breaking down of price control schemes, and the period of acute credit stringency, he said.

The major depression began last summer, he said. Mr. Ayres predicted reductions in industrial wages, cost of living and the cost of building. Increases will be made in export and import trade, net profits of railroads and utilities and more business failures.

The motor vehicle output for 1930 he predicted would fall more than 2,000,000 units below that of 1929 in the United States and Canada. It is unlikely, he said, that the sales of new cars for 1931 will run ahead of 1930. Prospects for expansion in iron and steel during 1931 are as unfavorable as those of the building and automobile industries. Mr. Ayres added, however, that he saw hope in the new financing this year which promises to be greater than any year except 1927, and will aid construction.

Mexican Imports Decrease

LAREDO, TEX., Dec. 11—Exports of American-made automobiles to Mexico through the Laredo port of entry showed a considerable decrease during November, as compared with the previous month. The total number of automobiles exported through here last month was 144, most of them consigned to dealers in Monterey and Mexico City. It is expected that when the new plant which the Ford Motor Co. plans to construct in Mexico City is in operation there will be a marked decrease in the purchase of foreign-manufactured cars.

Chrysler Issues Statement

NEW YORK, Dec. 10—Quarterly statement of the Chrysler Corp. shows accumulated profit for the first nine months of the current year of \$2,492,747. Operations for the third quarter show a net loss of \$916,108. Surplus as of Sept. 30 is \$49,322,549 after providing for dividends.

Two Durant Units May Split Off

(Continued from page 879)

automotive industries to his stock holdings in the parent company, which includes as its two remaining subsidiaries, Durant Motors of Michigan and the American Plate Glass Corp.

W. C. Durant, Norman de Vaux and Roy D. Kerby all refused to make official statements concerning supposed developments. Officials of Durant Motors of Michigan, subsidiary of Durant Motors, Inc., also refused to comment.

The year 1930 has seen swift, important changes in the corporate set-up of Durant Motors, Inc. Prior to the first of the year the Durant Acceptance Corp. was dissolved, stockholders being reimbursed at about \$15 a share. The concern realized about \$12.75 a share from sale of the stock.

A. A. Henninger, a director of Durant, Inc., and associates, purchased three of the eight subsidiary companies when, on July 21, all of the parent company's interest in the New Process Gear Co., Adams Axle Co. and Warner Corp. were purchased by the then newly organized Syracuse Gear Corp. of Syracuse, N. Y.

By the first of August the executive offices, engineering and purchasing departments were moved to Lansing from Detroit. It was reported about the same time that the company's activities in Germany were to cease.

On Aug. 5, Frederick J. Haynes resigned as president of the company, and two weeks later W. C. Durant resumed the presidency, a post he had resigned 18 months earlier. Among new directors were E. E. C. Mathis, Mr. Kerby and Mr. de Vaux.

Mr. Durant announced that his company would manufacture the Mathis, and became a director of the American Mathis, Inc., which had been just formed to merchandise the diminutive cars in this country.

Late in August Ralph Vail, the only remaining important executive of the company as of a year before, resigned as vice-president and director of Durant, Inc. Last week Harry J. Shorter, general sales manager since July, also resigned.

The Elizabeth, N. J., plant of Durant Co. of N. J. was sold to the Bayway Terminals on Sept. 2 in a \$5,000,000 deal.

Establishes San Francisco Plant

SAN FRANCISCO, Dec. 8—Chevrolet Commercial Body Division of Chevrolet Motors Co. has established a branch assembling plant at 2600 Harrison St., San Francisco. The new concern occupies 6500 ft. of floor space with spur track facilities, and will receive warehouse shipments and will assemble bodies for all types of trucks and commercial vehicles of the Chevrolet line. Charles D. Sheldon has been appointed manager.

EVENTS DURING NEW YORK SHOW WEEK

Auto. Merchants Asso., Pre-Show Dinner, Commodore	Jan. 2
Pierce-Arrow, Luncheon, Plaza Hotel,	Jan. 3
International Registration, N.A.C.C. Office	Jan. 3
Franklin Mfg. Co., Luncheon, Commodore	Jan. 5
Packard Motor Car Co., Luncheon, Roosevelt, 12.15 noon	Jan. 5
Nat'l Auto. Dealers Asso., Meeting, Commodore	Jan. 5
International Luncheon, N.A.C.C. Office	Jan. 5
Hupp Motor Car Co., Luncheon, Commodore	Jan. 5
International Trade Conf., Meeting, N.A.C.C. Office	Jan. 5
Rubber Manufacturers Asso., Dinner, Commodore	Jan. 5
Metropolitan Section S.A.E., Dinner, Commodore	Jan. 5
Nat'l Asso. of Show & Asso. Mgrs., Luncheon, Roosevelt, 12.30 noon,	Jan. 6
Auburn Automobile Co., Luncheon, Commodore	Jan. 6
Hupp Motor Car Co., Luncheon, Commodore	Jan. 6
Nat'l Auto. Chamber of Com., Banquet, Commodore	Jan. 6
Marmon Motor Car Co., Luncheon, Commodore	Jan. 7
Hupp Motor Car Co., Luncheon, Commodore	Jan. 7
Nat'l Auto. Chamber of Com., Directors' Meeting, N.A.C.C. Offices	Jan. 7
Federal Distributors, Meeting, Commodore	Jan. 7
Federal Distributors, Dinner, Commodore	Jan. 7
Motor & Equipment Asso., Dinner, Astor	Jan. 7
Chevrolet Motor Co., Dinner, Commodore	Jan. 7
Willys-Overland Co., Banquet, Commodore	Jan. 8
Olds Motor Co., Dinner, Hotel Astor,	Jan. 8
Hupp Motor Car Co., Luncheon, Commodore	Jan. 8
Overseas Automotive Club, Dinner	Jan. 8

EVENTS DURING CHICAGO SHOW WEEK

Chicago Auto Trade Asso., Pre-Show Dinner, Congress	Jan. 23
Pierce-Arrow, Luncheon, Stevens	Jan. 26
Franklin Mfg. Co., Luncheon, Blackstone	Jan. 26
Hupp Motor Car Co., Luncheon, Stevens	Jan. 26
Nat'l Auto. Dealers Asso., Meeting, Palmer House	Jan. 26
Hupp Motor Car Co., Luncheon, Stevens	Jan. 27
Federal Distributors, Meeting, Stevens	Jan. 27
Federal Distributors, Banquet, Stevens	Jan. 27
Nat'l Auto. Dealers Asso., Banquet, Commodore	Jan. 27
Auburn Automobile Co., Luncheon, Stevens	Jan. 27
Packard Motor Car Co., Luncheon, Blackstone, 12.15 noon	Jan. 27
Nat'l Asso. of Show & Asso. Mgrs., Luncheon, Palmer House, 12.30 noon	Jan. 27
Hupp Motor Car Co., Luncheon, Stevens	Jan. 28
Nat'l Auto. Chamber of Com., Directors' Meeting, Stevens	Jan. 28
Marmon Motor Car Co., Luncheon, Palmer House	Jan. 28
Olds Motor Works, Dinner, Congress,	Jan. 28
Willys-Overland Co., Banquet, Palmer House	Jan. 29

Mich. Steel Considers Merger

DETROIT, Dec. 8—A special meeting of stockholders of the Michigan Steel Corp. has been called for Monday, Dec. 22, in Jersey City, to consider sale of the company to the National Steel Corp. Under the terms of the offer Michigan Steel would receive about \$6,000,000 in notes, bonds or debentures, and about \$3,000,000 in cash and 60,625 shares of National's common, or, at the election of individual stockholders, \$50 per share for each share not taken.

Hunt Talks Patents To Phila. Section

General Motors Official Sees Need for Clarification

PHILADELPHIA, Dec. 11—A talk on The Automobile Industry and the American Patent Situation was given at the December meeting of the Philadelphia Section of the S.A.E. last night by J. H. Hunt of the Patent Section of General Motors Corp.

Mr. Hunt illustrated some of the difficulties under our present patent law and practice by an hypothetical case. One of the things causing most grief to industry is that a patent application can be kept in the patent office for years, by repeatedly amending the claims within the delays permitted by the law, and be brought to issue after the art to which it relates has been greatly developed by others. While a patent application is thus being prosecuted in the patent office the public has no knowledge of its existence.

To remedy this situation, Mr. Hunt suggested that hereafter all cases that have been in the Patent Office for three years be disclosed to the public. In this same connection he considered it desirable that the life of a patent be limited to 20 years from the date of application.

Another suggestion made was that interferences be done away with and that patents be granted to those who first apply for them.

Peerless Adds Workers

CLEVELAND, Dec. 11—Approximately 500 men have been employed or reemployed by the Peerless Motor Car Corp., Cleveland, Ohio, during recent weeks, according to announcement at the plant. Sales in Cuyahoga County through the company's own sales organization have more than doubled for the month of November over the month of October.

Maryland Revenue Rises

BALTIMORE, Dec. 9—Gasoline tax collected in Maryland this year is expected to amount to about \$7,466,500, or about \$1,000,000 more than last year. This total bases the estimate for the last two months on the figures of the first ten months and for November and December, 1929.

Roland on Truck Committee

NEW YORK, Dec. 11—H. W. Roland, sales manager of the commercial truck division of the Reo Motor Car Co., has been appointed a member of the Truck Committee of the National Automobile Chamber of Commerce.

Mack Reduces Dividend

NEW YORK, Dec. 8—Mack Trucks, Inc., has reduced its quarterly dividend to \$1 payable Dec. 31 to holders of record Dec. 15.

Associated Equipment Produces for Export

Four Types of Trucks Designed for Field

LONDON, Nov. 28 (by mail) — The Associated Equipment Co., one of the most prominent British manufacturers of trucks and buses and the manufacturing subsidiary of the London General Omnibus Co., announces today a special series of freight and passenger chassis for export where unmetalled roads must be negotiated.

There are four types, all based on existing models, but they will be distinguished from the latter by bearing the name "Aclo," instead of "A.E.C."

There is the Aclo Ranger, with a six-cylinder engine developing 110 b.h.p. at 2500 r.p.m.; an off-centered rear axle permits a low floor height for the 26-28 seated bus body with either right-hand or left-hand steering and controls and twin servo braking.

The Aclo Mercury is a 3½ long-ton freight chassis with a four-cylinder engine developing 65 b.h.p. at 2000 r.p.m.; it has a wider track (1600 mm.) than the corresponding A.E.C.; a steering damper is fitted, a K.P. governor, 30 x 7 in. front tires and 12-in. single rear tires. The Aclo Majestic is a 6 long-ton freight chassis with the same six-cylinder engine as the Ranger bus, while the fourth of the series is the Aclo F.W.D. 4-ton freight chassis with the same four-cylinder engine as the Aclo Mercury, front and rear-wheel drive; and an auxiliary gearset that affords a two-wheel drive on high and a four-wheel drive on low. Tires are 38 x 9-in. single pneumatics and braking by vacuum servo.

Checker Reduces Dividend

NEW YORK, Dec. 10—Checker Cab Mfg. Corp. has declared regular monthly dividend for the first three months of 1931 of 15 cents a share payable on the second of each month to stockholders of record on the 20th of the preceding month. This places the stock on an annual basis of \$1.80 per share, as compared with the former basis of \$4.20 a share.

In commenting upon this, Morris Markin, president, said that the board of directors considered it a conservative policy to begin dividends for the new year at a moderate rate in view of the uncertainties of the general business situation.

Austin Roadster on Line

BUTLER, PA., Dec. 11—Actual manufacture of the Bantam roadster has been begun by the American Austin Car Co., and some examples of this type are in the hands of dealers, according to officials of the company. Bodies for the roadster are being made by the Hayes Body Corp., Grand Rapids, Mich.

Chevrolet Cleveland Dealers Meet Factory Officials

CLEVELAND, Dec. 11—Over 600 Chevrolet dealers and their associated bankers in this district attended the annual winter dealer meeting held in Cleveland by the Chevrolet Motor Co. last week. Brief speeches were made by H. H. McMahon, vice-president of General Motors Acceptance Corp., and L. F. Skutt, general manager of Motor Accounting Co.

Credit Agencies Unite

NEW YORK, Dec. 11—R. G. Dun Corp., just organized here, will take over R. G. Dun & Co., the world's largest mercantile agency, operating 284 offices in the world, and the National Credit Office, which was formed 20 years ago, maintains an automotive division and is the official credit organization of the National Standard Parts Association.

The new corporation's directors will consist of present owners and representatives of the two concerns. Present resources of the companies are sufficient for the expansion program planned, and no new capital will be added.

The companies will be operated as separate units. It is understood that A. D. Whiteside, president of the National Credit Office, will head the new corporation.

Rover Operations Good

LONDON, Nov. 28 (by mail)—Captain S. B. W. Wilks, general manager of the Rover Motor Co., yesterday declared that "there is plenty of business about for any motor manufacturer who offers really good value for money, and there will be for years to come."

As confirming the first part of that statement he said that the Rover plant at Birmingham is working a night shift, that the Coventry plant is on overtime and that there are now actually more workpeople employed building Rover cars than ever before.

Orders received and cars dispatched during the past three months, he added, show a striking increase, as compared with the corresponding period last year. Export figures for the three months alone are nearly 300 per cent in advance of the total for the whole of the previous 12 months, home orders have increased by 78 per cent and actual deliveries by over 22 per cent.

Plans Truck Assembly Plant

DAVENPORT, Dec. 9—The Chevrolet Motor Co., which has a zone office here, has leased 8000 sq. ft. in the former Brammer Washington Machine Building on Rockingham Road, and will establish a truck assembly plant there immediately.

T. J. Schuster will be in charge of the assembly unit which will employ a staff of 15 men and handle a complete line of Chevrolet truck bodies.

Chevrolet Establishes Truck Body Assembly

Des Moines Plant is One of Two in Iowa

DES MOINES, Dec. 10—The new truck body assembly plant of the Chevrolet Motor Co. in this city will be located at Fifth and Murphy Sts., A. A. Murphy, Chevrolet representative, announced, and has taken charge of arrangements for establishing the plant. H. J. Klingler, vice-president and sales manager for Chevrolet, who was in this city this week at a general meeting of 400 dealers, stated that establishment of the plant became a necessary adjunct to the zone office equipment and service in Des Moines. He said that 25 men would be employed at the present, but as conditions warrant, this force will be enlarged.

Martin Enters Production

(Continued from page 879)

of the Brewster-Rolls-Royce coach plant on Long Island, has designed the bodies on the new cars. Chief engineer in charge of plant operations is M. H. Carpenter, designer of the Phinea, an expensive car built for a limited market.

According to Mr. Bryan, Martin Motors is in possession of 50,000 individual orders for the new cars, some of which are for the type which has not yet gone into production. Applications for dealerships are being received from all parts of the United States, he said, and it is expected that the first cars will be in the hands of consumers about Jan. 20.

Met Section S.A.E. Meets

NEW YORK, Dec. 11—Paul G. Goldsborough, vice-president of American Radio, Inc., told the Metropolitan Section of the Society of Automotive Engineers at its regular monthly meeting here last night what radio is doing for air transport. He also described how radio range beacons serve aircraft, how the air mail map was developed and how air line radio chains are operated.

Charles I. Stanton, airways engineer of the Department of Commerce, also discussed the application of radio to recent airways developments.

Rolls-Royce Shifts Activity

SPRINGFIELD, MASS., Dec. 11—Transference of coach-building operations of Rolls-Royce of America, Inc., from its Long Island City plant to East Springfield, was announced tonight by President Henry J. Fuller. The unit was removed from this city in 1927 and the return is described as an economy move.

Employment will be offered several hundred workmen after Feb. 1. Manufacture of seaplane equipment will be continued at Long Island City.

M. & E. A. Elects David Beecroft

Executive Committee of Association Also Named

NEW YORK, Dec. 10—David Beecroft, vice-president, Bendix Aviation Corp., and a former vice-president of the Chilton Class Journal Co., has been named vice-president of the Motor and Equipment Association in charge of Division A, to serve in place of C. H. L. Flintermann, Wilcox-Rich Corp., Detroit, who advised the board of directors that he would be unable to serve.

The executive committee of the association named by the directors includes E. T. Satchell, president, Motor Accessories Co., Allentown, Pa.; David Beecroft; C. F. Wright, Ballou & Wright, Portland, Ore.; C. H. Burr, SKF Industries, New York; C. C. Secrist, Victor Gasket & Mfg. Co., Chicago; G. L. Brunner, Brunner Mfg. Co., Utica, N. Y., and George Niekamp, Beck & Corbitt Co., St. Louis. All the standing committees have been appointed.

Continental Assists Workers

DETROIT, Dec. 9—A plan for the relief of employees of the Continental Motors Corp., who might be in distressed circumstances because of conditions arising out of the business depression, has been created by the salaried employees of the corporation at its Detroit and Muskegon, Mich., plants.

Acting on their own initiative, a small group of salaried executives individually pledged the payment of a certain sum each month for a period of five months to a fund designated as the Continental Motors Corp. Good Will Fund—its administration to be in the hands of a small committee at each plant. An invitation was extended to all salaried employees to participate voluntarily.

In appreciation of the spirit of good will displayed, the board of directors of the corporation voted to assist the fund at both plants with monthly contributions.

Underwriters Meet

NEW YORK, Dec. 10—The National Automobile Underwriters Association at its annual meeting here yesterday, elected the following officers: R. M. Bissell, Hartford Fire Insurance Co., was reelected president; R. P. Barbour, Northern Assurance, vice-president, and C. C. Hannah, Fireman's Fund, treasurer.

President Bissell pointed out during the meeting that automobile insurance is confronted with difficulties growing out of the fact that both the first and casualty business are involved in its transaction and that their ultimate solution may require an organization in which both classes are represented.

Albert Kahn to Speak

CLEVELAND, Dec. 11—The principal speaker for the meeting of the Cleveland Engineering Society at the Hotel Cleveland, Dec. 16, will be Albert Kahn, industrial architect, who designed the Ford Motor Co. factories and other automotive plants in Detroit.

Irving to Design Cycle

It was announced Nov. 28, in London, that the Rudge-Whitworth Co., makers of the R.W. wire wheels and Rudge motorcycles, have commissioned Captain H. B. Irving, design of the late Sir Henry Segrave's speed record car, "Golden Arrow," to design a motorcycle to attack the world's record of 150.736 m.p.h. recently set up by J. S. Wright in Ireland on a British O.E.C. machine, beating the existing record held by a German rider and machine by 13.07 m.p.h.

Captain Irving will probably use four single-cylinder engines having a total piston displacement of 2000 cc. (double that of Wright's machine) and will arrange them in the form of two coupled wide-angle Vee twins. It is not decided whether supercharging and streamlining will be used (Wright had both), for it is believed that 170 m.p.h. will be attained without either.

It is not expected that the machine can be built and tuned up ready for an attack on the record to be made in less than six months. The rider will probably be E. G. Nott, who won one of the Tourist Trophy races in the Isle of Man this year.

Kellett to Make Autogiro

PHILADELPHIA, Dec. 11—Kellett Aircraft Corp. expects to be in production on its first commercial Autogiro models some time in the early spring.

For the past year and a half Kellett engineers have been studying existing Autogiros and Autogiro theory under the license agreement held by the company for the use of the Pitcairn-Cierva Autogiro patents.

The Kellett Aircraft Corp. is a Delaware corporation, organized in July, 1929, with authorized capital of 130,000 shares of no-par value common stock. Offices are in the Atlantic Building. The officers of the company, who are also directors, are W. Wallace Kellett, president; C. Townsend Ludington, vice-president; R. G. Kellett, secretary and treasurer.

Autocar Books \$1,000,000 Order From Municipality

ARDMORE, PA., Dec. 10—A million-dollar truck order from the Sanitation Commission of New York City has been placed with the Autocar Co. It calls for the delivery of 174 Model SCHSB Autocar chassis within 60 days. As a result of this and other orders that have been received during the past week, the Autocar factory has resumed full-time schedule.

Truck Operators Select Hungerford as President

Form Committee to Extend Association's Activities

NEW YORK, Dec. 10—The Motor Truck Association of America, Inc., at its annual meeting today at Hotel McAlpin elected the following officers: I. A. Hungerford, president, Borden's Farm Products Co., Inc.; Hermann Irion, Steinway & Sons, Roderick Stephens, Stephens Fuel, Inc., and H. E. De Lisser, De Lisser Motors, Inc., vice-presidents; Lyman Da'F Brandon, secretary; A. G. Baumgartner, treasurer. William T. Bostwick, The Thos. J. Stewart Co.; J. D. Bradley, Knickerbocker Ice Co.; E. A. Buchmann, H. C. Bohack Co.; Edward J. Dugan, Dugan Bros.; D. C. Fenner, Mack Trucks, Inc.; Joseph Husson, Vacuum Oil Co.; E. E. La Schum, Railway Express Agency, Inc., and N. Mallouf, Mallouf Haulage & Maintenance Co., directors for three years. Nominating committee for 1931: E. P. McDowell, chairman; John H. Jacobs, D. A. Glover and William Murray.

It was decided to form an executive committee which would meet weekly and extend the activities of the association into many fields which heretofore it has not entered.

Australian Motorists Form Association

WASHINGTON, Dec. 9—An organization to be known as the Australian Automobile Association, embracing practically all automobile clubs in Australia and representing 120,000 active motorists, is being formed, states a cable to the Automotive Division, Department of Commerce, from trade commissioner, J. E. Peebles, Sydney.

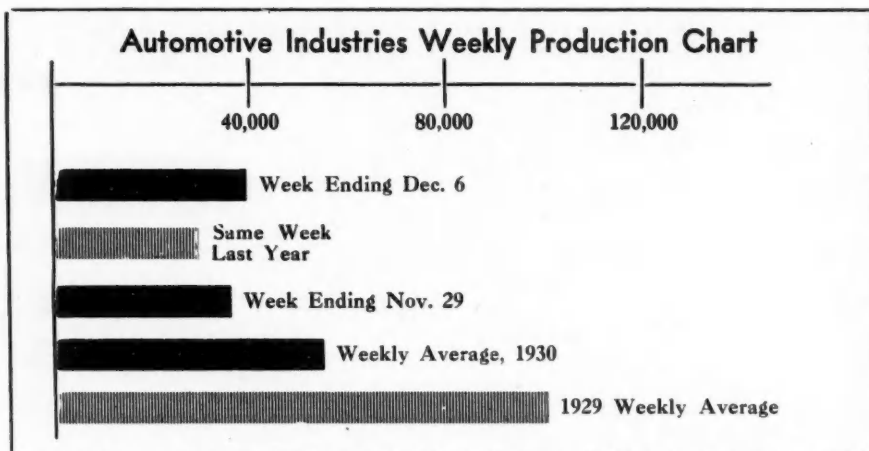
The new association, which will have its headquarters in Sydney, is being organized for the purpose of presenting a united front to Parliament on all subjects affecting private owners of automobiles.

Completes Conference Plans

WASHINGTON, Dec. 11—Plans for the National Conference on Uniform Aeronautic Regulatory Laws, to be held in Washington, Dec. 16 and 17, under the auspices of the aeronautics branch of the Department of Commerce, have been completed, it was announced today by Clarence M. Young, assistant Secretary of Commerce for aeronautics. Mr. Young will be chairman of the conference, and will outline the purposes of the conference.

Paton Joins Packard

Clyde R. Paton, recently laboratory engineer of Studebaker Corp., South Bend, has joined the engineering department of the Packard Motor Car Co. Mr. Paton's new activities will be along experimental lines.



Marmon Divides Body Activities

INDIANAPOLIS, Dec. 10—Plans have been announced by the Marmon Motor Car Co. whereby body finishing processes will be resumed in the Indianapolis plants of the concern rather than by the Hayes Body Corp.

According to G. M. Williams, president, a part of one of the buildings of the Marmon company will be turned over to Hayes for the rough assembly of bodies. The remainder of the operations will be performed by Marmon employees. At present it is planned to put the new plant into effect shortly after the first of the year. It is expected that between 150 and 200 employees will find work in the new activity.

Mr. Williams explained that the change had been made to provide employment for as many men as possible at the Marmon plant.

Georgia Dealers to Organize

ATLANTA, Dec. 9—Early call for a state-wide meeting of Georgia automobile dealers for the purpose of forming a state association is seen in the immediate results of a questionnaire recently sent by leading Atlanta automotive figures to about 600 dealers in this state. A large number of the flood of replies urged that such an organization be perfected immediately. C. V. Hohenstein is acting executive secretary. Besides Mr. Hohenstein the organization committee in charge of the plans are: H. H. Alexander, chairman; R. H. Martin, D. C. Black and Clarence Knowles.

Tire Plants Recall Men

AKRON, Dec. 9—Christmas presents in the way of additional work cheered old employees of Goodyear and Firestone Tire companies today. Paul W. Litchfield, president of Goodyear, announced that beginning Jan. 5 work in the Goodyear plant would be placed on an eight-hour, five-day-a-week basis. No additional men will be taken on, but increased hours for those employed is assured by Mr. Litchfield's announcement.

This follows an announcement of Harvey Firestone, Sr., that 1000 old employees of the Firestone plant were taken back and put to work yesterday. Mr. Firestone said no new men will be taken on. Work for additional 1000 will be given only to former employees, laid off during the depression, and who have continued their residence in Akron.

The Goodyear plant is now working four six-hour shifts, and since July has been rotating jobs to keep as many experienced men as possible on the payroll. The change of hours will increase the daily output to 48,000 tires and 55,000 tubes per day. The firm has maintained an output of 30,000 tires daily during the depression.

Willys Carolina Dealers Meet

CHARLOTTE, N. C., Dec. 9—J. H. Gerkens, vice-president, and N. A. Beardsley, general sales manager of the Willys-Overland Co., were the chief speakers at a recent meeting of Willys-Overland dealers in this city. Approximately 125 dealers from the two Carolinas were in attendance. J. B. Dorris, head of the Dorris-Greene Motor Co., local Willys-Overland dealer, was the presiding officer of the meeting.

To Distribute Ford Tractors

ATLANTA, GA., Dec. 9—Appointment of the Southern Iron & Equipment Co. of Atlanta as distributor of Fordson tractors in the Southeastern States has just been announced by officials of the Ford Motor Co.

Stock to be Listed

DETROIT, Dec. 9—Common stock of the Motor Products Corp. has been approved for listing on the Detroit Stock Exchange. Of the 500,000 shares of authorized common stock 215,000 will be listed.

Ford Output 51,923

DETROIT, Dec. 8—World production of Ford cars and trucks in November was 51,923, as compared with October world production of 78,347.

Metal Markets Mark Time Now

Advance in Steel Prices Causes Little Excitement

NEW YORK, Dec. 11—All of the metal markets are more or less marking time, the general expectation being that beginning with next week slowly increasing interest on the part of buyers will make itself felt. Activity in steel continues along little changed lines. Announcement late last week of an advance of \$1 per ton in the price of heavy steel products, bars, shapes and plates was expected to be followed by an upward revision in first-quarter 1931 prices for flat-rolled steel, sheets and strip, but while it is generally conceded that prices for these descriptions are at bottom and will yield no further, producers would derive little immediate benefit from an announcement of higher first quarter prices.

They have in the aggregate a considerable amount of first quarter business on their books at old prices, made up of small lots, and under present conditions buyers would have to be given a chance to cover their needs at old prices for a limited time. So at best announcement of an advance would mean "smoking out" of orders at old prices.

Outside of the U. S. Senate, where they talk of quotations for steel ingots, although this "raw" form of steel is only traded in on the rare occasions of a steel famine, the advance in heavy rolled steel quotations caused no excitement. Not even Wall Street paid very much attention to it. In the steel market it was accepted as a moderate price readjustment predicated on confidence that a better volume of demand will develop in support of the advance which still leaves the price of steel bars \$5 a ton under the price of a year ago at this time.

Fig Iron—Business generally is light. Prices are holding their own.

Aluminum—Unchanged and quiet.

Copper—The market was virtually at a standstill during the first few days of the week. Custom smelters quote 11 cents for nearby shipment, delivered Connecticut, and 11½ cents, delivered Middle West. In the "outside" market some December copper has been offered at 10¼ cents.

Tin—At the opening of the week the price for Straits tin declined to 25 cents. There is only light consumer demand, but also little selling pressure.

Lead—Quiet and unchanged.

Zinc—The market is slightly firmer due to holders not pressing metal for sale. Consuming demand is light.

Lincoln Sells 105 at Salon

DETROIT, Dec. 9—Retail sales of new Lincoln automobiles at the New York Automobile Salon totaled 105 cars, exclusive of sales to dealers for stock and demonstration purposes. The Salon sales were more than three times as great as those reported during the 1929 Salon. The first showing of the standard types will be made in Detroit next Saturday, and custom types will be displayed at the same time.

General Tire Earns And Pays Dividend

Profits in 6 Months Cover Year's Needs

AKRON, Dec. 9—The General Tire & Rubber Co. maintained its record of unbroken stock dividend payments today by declaring the regular quarterly dividend of 1½ per cent on preferred shares.

This distribution, the 54th consecutive return, is payable Dec. 31 to stockholders of record Dec. 20. During the fiscal year which ended Nov. 30 the directors declared usual common stock dividends amounting to \$4 a share.

William O'Neill, president of the company, recently announced net profits for the first six months of the fiscal year were sufficient to cover regular dividend requirements on both classes of stock for the entire year.

Should earnings justify an extra dividend on the common stock, such action may be taken at the annual directors and stockholders meetings on Dec. 30, company officials announced.

Fisk May Reorganize

NEW YORK, Dec. 8—Fisk Rubber Co. has formed three protective committees representing holders of common stock, bonds and notes, respectively, who will endeavor to work out a plan of reorganization to restore the company's credit and earning power. This move has been taken because depletion of the company's working capital has made it impracticable for the company to refund its issue of \$8,199,500 in 5½ per cent notes maturing Jan. 1.

H. T. Dunn, president of the company, in a statement announcing the appointment of these committees, stated that officers and directors have approved this move.

FWD Resumes 10-hr. Schedule

CLIFTONVILLE, WIS., Dec. 8—After reducing the workday to 8 hours, but with a full complement of 700 men for several weeks, the Four Wheel Drive Auto Co., Cliftonville, Wis., has resumed its 10-hour schedule to meet recent increases in orders. According to Walter Olen, president, FWD business for 1930 will run at least 20 per cent ahead of 1929, which was the greatest commercial business year that the company has ever had. Several outstanding fleet orders were executed this year, the largest being from the U. S. Army for 120 trucks.

Allis Orders Increase

CHICAGO, Dec. 9—Unfilled orders of the Allis-Chalmers Manufacturing Co. Nov. 30 showed a slight gain over the same date a year ago, the total being \$14,258,000 against \$13,533,000 in 1929.

General Motors to Hit German Market With New Opel Light Six-Cylinder Car

BERLIN, Nov. 27 (by mail) — The Adam Opel Co., which is affiliated with General Motors Corp., has developed a new six-cylinder car of 109 cu. in. piston displacement and 32 b.hp. output. The car, which will be ready for delivery early next year, was shown at a recent dealers' meeting and met with an enthusiastic reception, as it seems to be about the best value yet offered in the German car market. As a four-passenger four-door sedan it lists at only \$785, while the convertible roadster with double rumble seat lists at \$755 and the four-passenger "sunshine sedan" at \$820.

Improvements have been made also in the small four-cylinder Opel of 67 cu. in. piston displacement. It now comes equipped with Nelson Bohnalite pistons, a new cylinder head, and improved inlet and exhaust manifolds, and these changes, together with the adoption of a new vertical carburetor, are said to have raised the power output by 20 per cent. The equipment also has been added to, and the car is now delivered with a spare wheel and tire, larger headlights and fenders, rubber covering on the running boards and an automatic windshield wiper.

Prices remain the same, the roadster selling at \$475, the four-passenger

phaeton at \$555, the two-passenger convertible at \$595 and the sedan at \$690. The value of the improvements is estimated at \$75, so that purchasers will receive much more for the money in the future.

At the same time a change in warranty policy has been announced by the Adam Opel Co. The period of the guarantee remains the same as in the past, six months, but hereafter defective parts will not only be replaced free under the guarantee, but they will also be installed on the car free of charge, and the service includes periodical free inspections of the car. This new service can be put into effect only after a rule of the German Automobile Manufacturers Association, adopted two years ago, has been rescinded, and it is hoped that this will be done at the beginning of the coming season.

The new Opel program also includes two new trucks. One is equipped with a four-cylinder 158 cu. in. engine and has a carrying capacity of 1½ tons, while the other is equipped with a six-cylinder engine of 213 cu. in. displacement (similar to the Marquette) and is designed for loads of 2 tons. The smaller chassis lists at \$785 and the larger one at \$1,095.

Stutz Seeks More Capital

NEW YORK, Dec. 8—Stutz Motor Car Co. of America is seeking additional capital by the issuance of 81,974 shares of no par common stock priced at the market, of which certain stockholders have agreed to purchase 58,619 shares. Former stock was recently reduced from 296,741 shares to 29,674 shares by the exchange of one new share for each ten of the old held.

On completion of this new financing, outstanding capitalization of the company will consist of \$482,000 of convertible 7½ per cent bonds due in 1937, and 111,649 shares of no par common stock. An additional 100,025 shares of common stock have been reserved for bond conversion and for options to bankers and present stockholders.

George P. Miller Dies

MILWAUKEE, Dec. 10—News has been received here of the death of George P. Miller, one of the earliest passenger car distributors in Wisconsin. For many years he was engaged with Rudolf and Emil Hokanson as Buick distributor in western Wisconsin. Upon the organization of Nash Motors in 1916 Mr. Miller and Rudolf Hokanson left Buick and organized large middle western territory for Nash. Mr. Hokanson eventually became Wisconsin distributor and Mr. Miller took Chicago territory. After leaving Nash, Mr. Miller became head

of the Marmon distributorship in Chicago, but resigned a short time ago because of ill health. He was 62 years of age and a native of Wisconsin.

Washington Section to Meet

WASHINGTON, Dec. 11—Prominent speakers will address the Washington section of the Society of Automotive Engineers at its open meeting at the Washington Hotel Dec. 15 which will be of interest to both layman and engineer. A program of entertainment also has been arranged. The dinner will begin at 6.30. Notable persons will be in attendance. William P. McCracken, Jr., will preside as toastmaster. A. Preston Petrie, research engineer for the American Hammered Piston Ring Co., will give an address on "Piston Ring Manufacture and Progress."

Dr. Karl Arnstein, vice-president and chief engineer of the Goodyear Zeppelin Corp., will deliver an address on "Interesting Points in the General Problems of Airship Design," and will also present lantern slides on the subject.

Lincoln Adds Employees

DETROIT, Dec. 8—Lincoln Motor Co. has recalled 800 employees to work within the last month, and is increasing the number at the rate of 100 a week. There are now 2290 employees on the payroll.

Firestone Reports Profit; Sales Drop 17 Per Cent

New Service Program Helps Add Dealers

AKRON, Dec. 9—Despite unusually severe operating conditions in the rubber industry during current business depression, Firestone Tire & Rubber Co. showed a net profit of \$1,541,034 for the fiscal year ended Oct. 31, 1930.

This income was made on annual sales totaling \$120,015,633, which was 17 per cent under sales of the previous year. Net of \$1,541,034 represents profits after deductions for depreciation, interest, Federal taxes and expenditures on the Liberian development.

This year's profit is compared with \$7,826,870 net on sales of \$144,585,000 in the fiscal year ended Oct. 31, 1929. Current ratio between assets and liabilities as shown on this year's balance sheet is 14 to 1. Surplus account has been reduced \$5,569,000 to \$41,984,248.

In releasing the annual statement to stockholders of the company today, Harvey S. Firestone, president, said:

"Our program, in establishing one-stop service stores has given us knowledge and experience that has been of great help to us and our dealers in building a larger retail business, along more economical lines and at more stable prices.

"We believe this, in no small measure, accounts for the fact that while it is estimated there are 25,000 less tire dealers today than two years ago, we succeeded last year in securing 6298 new dealers. We have established over 400 one-stop stores and have invested in them approximately \$25,000,000 in land, buildings and working capital."

Louisville Sales Slump

LOUISVILLE, Dec. 9—New car sales in Louisville for November were 244, against 475 in November of last year, a drop of 48.6 per cent. The month was the smallest in several years, and the decrease was much greater than the average for 11 months of 35 per cent, with 11 months sales at 6214 cars, as against 9554 for 11 months of last year.

Western Adds Furnace

BEAVER DAM, WIS., Dec. 10—Western Malleables, Inc., Beaver Dam, Wis., has placed a second furnace in operation as the result of new orders and release of delivery specifications from customers in the automotive industries. For several months only one furnace has been in use.

Studebaker Holders Increase

SOUTH BEND, Dec. 9—An increase of 33 per cent in the number of its stockholders during the past year is announced by the Studebaker Corp. Its stockholders numbered 22,512 on Nov. 9, 1929, and 30,021 on Nov. 10 of this year.

Bush Sees Improvement

CHICAGO, Dec. 8—Upon his return from a trip through the East, where he observed business conditions and sentiment in the larger centers, E. J. Bush, vice-president in charge of sales of the Diamond T Motor Car Co., Chicago, notes "many indications that the public is more confident of the future and that the nation has started on the upgrade of complete business recovery."

Glancy Malleable Corp. Ownership is Shifted

WAUKESHA, WIS., Dec. 8—Major interest in the Glancy Malleable Corp., Waukesha, Wis., has been disposed of by A. R. Glancy, Detroit, to a group of executives in charge of the active management, but he will retain an interest and will serve as chairman of the board.

Capitalization has been changed from 1000 no-par common shares to 12,000 shares, of which 9640 are to be presently outstanding. About 27 per cent of these shares have been sold to employees or placed privately. An issue of \$200,000 of 6½ per cent first mortgage bonds also has been privately sold.

In 1920, when General Motors Corp. built a large plant at Janesville, Wis., for the Samson Tractor Division, it acquired the Waukesha Malleable Iron Co. as a castings supply. When the Samson tractor project was abandoned and the Janesville plant was converted into a Chevrolet assembly base, Mr. Glancy acquired the Waukesha foundry, placing in charge L. D. Harkrider and L. A. Williams, former Samson executives.

They have built up a concern with a net worth of \$544,000 entirely out of earnings and have rebuilt and improved the plant so that it is now regarded as one of the lowest cost producers in the country, with ability to operate profitably even at 20 per cent of capacity. P. J. E. Wood, Janesville, Wis., has been elected president; Mr. Williams, vice-president, and Mr. Harkrider, secretary and treasurer.

To Test Stewart Plane

FLINT, Dec. 8—Stewart Mfg. Co., builders of automobile bodies and body parts, advise that the technical data on the twin-engined Stewart M-2 airplane has been approved by the Department of Commerce and that government tests on the plane itself will be conducted next week toward obtaining an approved type certificate.

Milwaukee Plant to Close

MILWAUKEE, Dec. 8—The Milwaukee Ford plant schedule for December at 1000 cars is the same as the October and November rate, and the full production force has been retained, it is announced. The plant will close for a few days following Christmas and reopen Jan. 2.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

NEW YORK, Dec. 11 — Trade throughout the country last week in many instances was quiet. The colder weather has helped retail trade to some extent, but most industries have been lagging. The New York Times weekly business index for the week ended Nov. 29 showed an increase for the first time since last August.

BUSINESS PROFITS

Business profits in the third quarter of this year, according to the Federal Reserve Bank of New York, showed further evidence of the business recession. Total net profits of 261 industrial and mercantile concerns were slightly less than one-half of those a year ago and 42 per cent smaller than those two years ago.

COMMERCIAL FAILURES

The number of commercial failures during November, according to R. G. Dun & Co., was 2031, as against 2124 during October and 1822 a year ago. The liabilities involved in the November failures amounted to \$55,260,730, as against \$56,296,577 in the preceding month and \$52,045,863 a year ago.

CAR LOADINGS

Railway freight loadings during the week ended Nov. 22 totaled 779,757 cars, which marks a decrease of 169,959 cars below those a year ago and a decrease of 249,480 cars below those two years ago.

CRUDE OIL OUTPUT

Average daily crude oil production for the week ended Nov. 29 amounted to 2,265,900 bbl., as against 2,281,850 bbl. for the preceding week and 2,638,200 bbl. a year ago.

FARM PRICES

The index of the general level of farm prices on Nov. 15 was 103, based on the pre-war level as 100, as against 106 a month earlier and 136 a year ago.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended Dec. 6 stood at 80.7, as against 80.6 the week before and 80.8 two weeks before.

BANK DEBITS

Bank debits to individual accounts outside of New York City for the week ended Dec. 3 were 16 per cent below those in the corresponding period last year.

STOCK MARKET

The stock market last week was quite dull. The volume of transactions was on a small scale. The price movement was irregular, but in general showed a downward tendency, with railroad issues particularly weak. Call money remained at 2 per cent. Most brokerage firms are advising a cautious policy until the resistance strength of the market is demonstrated.

Financial Notes

Doehler Die Casting Co. has declared regular quarterly dividends of 87½ cents on preferred and \$1.75 on \$7 preferred, both payable Jan. 2 to holders of record Dec. 20.

Goodyear Tire & Rubber Co. of California has declared regular quarterly dividend of \$1.75 on preferred, payable Jan. 2, to holders of record Dec. 20.

Motors Products Co. has declared regular quarterly dividend of 50 cents, payable Jan. 2, to holders of record Dec. 20.

Sparks-Withington Co. has declared regular quarterly dividend of 25 cents, payable Dec. 13.

Waukesha Motor Co. has declared regular quarterly dividend of 75 cents, payable Jan. 2, to holders of record Jan. 2.

Parker Bus Bill Put Back in Committee

WASHINGTON, Dec. 9—The action of the Senate last week in recommitting the Parker-Couzens motor bus bill increases considerably the doubt that already had prevailed that the measure could be passed at the present session of Congress.

Senator Couzens, chairman of the committee on interstate commerce to which the bill was recommitted, charged that a railroad lobby has been trying to kill the bill ever since the Senate at its previous session defeated the amendment of Senator Glenn of Illinois which proposed to strike out the provision prohibiting mergers of railroads and bus lines.

Recommitment of the bill was voted, 51 to 29, upon motion of Senator Smith of South Carolina, ranking Democratic member of the Interstate Commerce Committee, which, he said, is divided in its views on the measure.

Senator Couzens made no prediction that the bill would be returned to the floor of the Senate at the present session. It was unfinished business and its passage at the present session was urged by President Hoover in his message to Congress. The bill passed the House at the previous session.

Iowa Revenue Increases

DES MOINES, Dec. 9—For the fifth consecutive month the Iowa gas tax receipts have passed the million dollar mark, with October, the last month reported, reaching \$1,067,757.06, bringing the year's total to \$10,716,809.06. Officials estimate that the current year will exceed 1929 by \$1,500,000.

Five-ninths of the fund goes to the primary road system and the remainder to the secondary highways building fund. In addition, the primary fund this year will receive about \$12,500,000 from the motor vehicle license and truck fees this year.

To Make Refrigerator Bodies

OAKLAND, CALIF., Dec. 8—Motor Vehicle Refrigeration, Ltd., has been organized with headquarters in Oakland and will manufacture truck bodies equipped with electrical refrigeration apparatus.

Knudsen Addresses Dealers

CHICAGO, Dec. 9—"General business has started a strong recovery," said W. S. Knudsen, president of the Chevrolet Motor Co., last week in addressing 600 Chevrolet dealers of Chicago on an anti-depression tour. Mr. Knudsen predicted his company would build and sell 1,000,000 automobiles in 1931.

Show Space Taken

NEW YORK, Dec. 8—Practically all the space at the national shows available for parts, accessories and garage repair equipment manufacturers has been taken. About 75 members of the Motor and Equipment Association Manufacturing Divisions have taken space in these shows and together with those not members of the association the number of exhibitors will run over 100. Thirty-eight association manufacturers will exhibit in the parts-accessory sections and 34 in the shop equipment sections.

Group Fatalities Decrease

NEW YORK, Dec. 8—Traffic fatalities among children under 15 years of age have decreased nearly 30 per cent since safety education work was started eight years ago, according to a recent report of the Highway Education Board. Although complete statistics are unavailable, the report shows that fatalities in this group for 1929 will not greatly exceed 18 per cent of the total, whereas they were approximately 30 per cent of the total in 1922.

The report also shows that while motor vehicle registration has more than doubled during the eight-year period, fatalities have increased less than 85 per cent.

Chicago Collections Increase

CHICAGO, Dec. 9—In the first eleven months of this year, the city has collected \$112,211.50 more on all types of vehicle licenses than during a similar period in 1929, according to figures released by City Collector Morris Eller. The number of passenger automobiles increased from 291,799 in 1929 to 395,294 licensed in the 35 hp. or less class during the eleven months of this year, the figures show, and the number of higher powered cars increased from 10,299 to 11,614 during the same period.

City May Adopt Buses

AUGUSTA, Dec. 9—This city has under advisement a plan for the substitution of motor buses for its street car system. A special transportation committee of city council has the matter under advisement. The decision rests between buses and trackless trolleys. The Georgia Power Co., operator of present street car system, has agreed to install either recommended mode of transportation.

Free-Wheeling Patents Are Thrown Into Pool

Two More Makers Will Use Device

CHICAGO, Dec. 8—Pooling by the Studebaker Corp. and the Borg-Warner Corp. of patents and patent applications covering the free-wheeling type of transmission was disclosed yesterday coincident with the announcement that directors of the Borg-Warner Corp. had declared a quarterly dividend of 25 cents a share on the common stock, placing the issue on a \$1 annual dividend basis as against \$3 previously.

Through the pooling of the patents, the Borg-Warner Corp. has acquired an exclusive license for the manufacture and sale of free-wheeling transmissions as parts manufacturers.

The Warner Gear Co., a subsidiary, already is under contract to make transmissions for several large motor car companies. Another subsidiary, the Detroit Gear & Machine Co., is preparing for production also.

Two other manufacturers will make announcement of the adoption of free-wheeling when their new models are placed on display at the automobile show in New York in January. Commenting on these actions and future plans, C. S. Gray, president of the Borg-Warner Corp., stated: "In addition to the free-wheeling transmissions, we have planned the introduction of important new products during the coming year. These moves will be greatly facilitated by having a large cash reserve." The balance sheet of the Borg-Warner Corp. as of Oct. 31 showed current assets of \$15,837,521, of which \$6,980,660 consisted of cash, call loans and marketable securities.

Current liabilities, including tax reserve, were \$2,813,866, or a ratio of better than 5.5 to 1. The items of cash, call loans and marketable securities alone amount to \$2.48 for each dollar of current liabilities. This compares with a ratio as of Sept. 31, 1929, of 4.38 to 1.

The 25-cent dividend on the common stock and the regular quarterly dividend of \$1.75 a share on the preferred stock, also declared, are payable Jan. 2 to stockholders of record Dec. 15.

Output Estimate Reduced

NEW YORK, Dec. 8—Revised estimates for production of cars and trucks during November place the figure at 124,000 units, which is 20 per cent under October and 45 per cent under November of last year. This brings the total for the year to 3,339,032, or 39 per cent less than production for the first eleven months of last year. This is taken to indicate a greater improvement in dealers' inventories than had been anticipated by the National Automobile Chamber of Commerce.

Seiberling Reports Loss; Moves for Stability

Liberal Depreciation Factor is New Policy

AKRON, Dec. 9—Determination to start 1931 with a "clean slate" caused Seiberling Tire & Rubber Co. to adopt a liberal depreciation policy in announcing \$1,282,098 net loss for the fiscal year ended Oct. 31. In the annual report to stockholders, F. A. Seiberling, president, expressed his optimism, both for Seiberling's 1931 business and a turn in general business toward normalcy.

Net sales for the fiscal period, after deduction for all charges, were \$9,338,150.47, against sales of \$12,312,230 in preceding period. Net income in the 1929 period amounted to \$92,313 or approximately a loss of 14 cents a share on the outstanding common at that time.

"With inventory prices at cost or market value, whichever is lower, Mr. Seiberling's operating loss for this year was \$854,272.35," Mr. Seiberling stated in his annual report today. "Our statement shows no bank indebtedness and the current assets exceeded current liabilities by \$2,672,218.32, a ratio of more than four to one. Cash on hand is nearly equal to all current liabilities."

More than 1000 new dealers had been added in the last four months. "The Seiberling Rubber Co. can now make a profit on average monthly sales as low as \$600,000," it was said.

Canadian Goodyear Holds Up

NEW TORONTO, ONT., Dec. 9—Operations of Goodyear Tire & Rubber Co. of Canada, Ltd., have continued since the close of the fiscal year, Sept. 30 last, on an unaltered scale. Export trade is reported to have been kept up, although sales for this account remain considerably under those of one year ago. The company has benefited from the appreciation that has occurred in raw rubber. Sales of tires to motor car manufacturers are an important factor.

Packard Cable Installing Plant

TORONTO, Dec. 6—The Toronto Industrial Commission announces a new industry for the city of Toronto, the Packard Cable Co. of Canada, Ltd., which will manufacture ignition sets, battery cables and other accessories. The parent company is the Packard Electric Co. of Warren, Ohio. The new Canadian company, at 283 King Street East, is now installing its equipment, which has been purchased in Canada.

Chrysler Ships 7992

DETROIT, Dec. 9—Chrysler Corp. shipments in November totaled 7992 compared with 16,459 in November last year and 12,838 in October this year.

+ + CALENDAR + + OF COMING EVENTS

SHOWS

Brussels, Belgium, Automobile...Dec. 6-17
Sioux City, Iowa, Automobile...Dec. 18-20
New York, National Automobile...Jan. 3-10
National Roadbuilders' Show and Convention, St. Louis...Jan. 10-16
Buffalo, N. Y., Automobile...Jan. 10-17
Newark, N. J., Automobile...Jan. 10-17
Milwaukee, Wis., Automobile...Jan. 10-18
Cincinnati, Automobile...Jan. 11-17
Baltimore, Automobile...Jan. 17-24
Boston, Automobile...Jan. 17-24
Hartford, Conn., Automobile...Jan. 17-24
Montreal, Automobile...Jan. 17-24
Detroit, Mich., Automobile...Jan. 17-24
Pittsburgh, Pa., Automobile...Jan. 17-24
Louisville, Automobile...Jan. 19-24
Omaha, Neb., Automobile...Jan. 19-24
Rochester, Automobile...Jan. 19-24
Washington, D. C., Automobile...Jan. 24-31
Chicago, National Automobile...Jan. 24-31
Cleveland, Ohio, Automobile...Jan. 24-31
Milan, Italy, Automobile...Jan. 24-31
Los Angeles, Calif., Automobile...Jan. 24-Feb. 1
Portland, Me., Automobile...Jan. 26-31
Springfield, Mass., Automobile...Jan. 26-31
Syracuse, N. Y., Automobile...Jan. 26-31
Wilkes-Barre, Pa., Automobile...Jan. 26-31
Lancaster, Pa., Automobile...Jan. 27-31
Minneapolis, Minn., Automobile...Jan. 31-Feb. 7
St. Paul, Minn. (Joint show with Minneapolis)...Jan. 31-Feb. 7
San Francisco, Calif., Automobile...Feb. 1-8
Scranton, Pa., Automobile...Feb. 2-7
St. Louis, Mo., Automobile...Feb. 2-7
Camden, N. J., Automobile...Feb. 25-March 2
Denver, Automobile...Feb. 9-14
St. Petersburg, Fla., Automobile...Feb. 9-14
Mankato, Minn., Automobile...Feb. 11-14
Peoria, Ill., Automobile...Feb. 11-15
Rapid City, S. D., Automobile...Feb. 12-16
Indianapolis, Ind., Automobile...Feb. 14-19
Providence, R. I., Automobile...Feb. 14-21
Quebec, Automobile...Feb. 21-28
Des Moines, Automobile...Feb. 23-28
Seattle, Wash., Automobile...Feb. 24-Mar. 1
Altoona, Pa., Automobile...April 15-27
International Garage Exposition, Berlin, Germany...May 9-Aug. 9

CONVENTIONS

First International Aerial Safety Congress, Paris, France...Dec. 10-23
American Management Asso. (Shop Methods Division), Pittsburgh, Pa...Dec. 11-12
Highway Research Board, Washington...Dec. 11-13
National Research Council, Washington, D. C...Dec. 11-12
Motorcycle & Allied Trades Asso., Annual, New York City...Jan. 7
Society of Automotive Engineers, Annual Dinner, New York...Jan. 8
Society of Automotive Engineers, Annual Meeting, Detroit...Jan. 19-23
Natl. Association of Engine & Boat Manufacturers, New York City...Jan. 23
Natl. Paving Brick Mfg. Association, Pittsburgh, Pa...Feb. 4-6
A. S. M. E. Fuels Meeting, Chicago...Feb. 11-13
Society for Steel Treating (National Western Metal and Machinery Exposition), San Francisco...Feb. 16-20
Road Show and School, Wichita, Kan...Feb. 24-27
American Chemical Society, Indianapolis, Ind...March 30-April 4
Aeronautical Chamber of Commerce, Detroit...April 11-19
U. S. Chamber of Commerce, Atlantic City...April 28-May 1
International Chamber of Commerce, Washington, D. C...May 4-9

SALONS

Brussels, Belgium, Salon...Dec. 6-17
Los Angeles, Calif., Biltmore, Hotel...Feb. 7-14
San Francisco, Calif., Palace Hotel...Feb. 21-28

NOTE: New York and Chicago Show Weeks' Events are listed on page 881 of the News Section.

Wayne Registrations Reflect Ford Drop

But Seasonal Trend is Slightly Better

DETROIT, Dec. 8—While new passenger car registrations in Wayne County in November totaling 1768 showed a decrease of 30 per cent from the total of 2532 in November last year, it represents less of a decrease than did the October figures for 1930 over 1929.

The November registrations compare with a total of 2094 in October, a decrease of 15 per cent, most of which is accounted for by a dropping off of over 24 per cent in Ford registrations. Actual increases in November over October registrations were recorded by Chevrolet, Cord, Essex and Hupmobile.

Commercial vehicle registrations for the county last month totaled 427, as compared with 445 in October and 365 in November, 1929. Ford was first on the list with 291 and Chevrolet second with 59. Total commercial vehicles registered to date was 5191, as compared with 9539 for the same period last year.

Prairie Quits a Market

CHICAGO, Dec. 8—Prairie Oil & Gas Co. yesterday announced its withdrawal as a purchaser of crude oil in the Mid-Continent oil fields, effective Jan. 1, 1931. The announcement came as a distinct surprise to the petroleum trade, constituting as it did the most sensational of the many developments in the course of the industry's efforts to adjust itself to a position of balance and stabilization. The significance of the move is revealed in the fact that for the first time in thirty years—as long as there has been a Mid-Continent field—Prairie will be out of the picture as a market for independent oil producers' crude production.

Allis Has New Tractor

MILWAUKEE, Dec. 9—Allis-Chalmers Mfg. Co., Milwaukee, is announcing a new all-crop general purpose tractor, on which deliveries will begin Dec. 15. The chief feature of the new unit is expedition with which a cultivating rig can be attached or detached. This can be done by one man in 15 min. The new unit pulls three 14-in. plows in average soil conditions at a rate of 3 1/3 m.p.h.

Car Assessment Increase

ATLANTA, Dec. 8—Automobiles alone represent \$30,742,713 of Georgia's \$1,000,000,000, plus, assessed valuation of property in 1930, according to announcement by Comptroller General William B. Harrison. This represents an increase of more than \$1,000,000 over 1929, the valuation then being \$29,425,939.